The Chemical Age

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Labour in Chemical Works

A VISIT to the Annual Dinner of the Coke Oven Managers' Association reminded us that this branch of industry—we are not sure how far it would be correct to describe it as a branch of the chemical industry—has been mechanised under the stress of high labour costs and of labour unrest following the late war, until the capital charges now bear so large a ratio to the operating costs that any undue diminution in output may well cause operation to be unremunerative. Mechanisation, if it be accompanied by high capital costs, is not an unmixed blessing.

It is often argued that anything that removes the personal element is worthy of encouragement. This is undoubtedly true up to a point of any device that prevents mistakes owing to those curious personal aberrations to which the best are subject. Even these mechanical aids to automatic operation have their dangers. Workmen—and sometimes those who should know better—are apt to rely upon the machine and to assume that because all is going well, the *status quo* must of necessity continue. When, as inevitably happens sooner or later, the machine breaks down, the fact may be unsuspected long enough to cause serious damage to the plant or to the product. Too many mechanical gadgets remove the skill and self-reliance of the operator. On the other hand, unless process men are very carefully selected, the loss through inefficiency in the human machine may be much greater than the loss through occasional faltering of the mechanical operator.

There is, of course, no doubt that modern regulators of pressure, temperature, flow, etc., maintain a degree of uniformity of working that can never be equalled by hand operation. But it may be arguable that reliance on the machine and consequent lack of practice may dull initiative and lull the operator into a false confidence. He loses his alertness and many other qualities that are kept at high efficiency when he is constantly on the look-out for things going wrong. The effect of automatic control on the labour employed on the plant is an interesting psychological subject.

This leads to recollection of a paper on the selection of process workers for chemical plant that was published recently in "Occupational Psychology," by Dr. Hiscock, of Scottish Dyes, Ltd., Grangemouth, in the course of which a list was drawn up embodying the combined opinion of the departmental managers and foremen of the factory on the requirements of a good process man. It will be remembered in considering this list that at Grangemouth operations are more of the small batch type than concerned with bulk production, so that a large number of process workers are needed, about 220 if memory is accurate. The 19 qualifications comprised in the list appear to be pretty exhaustive in a process hand, but it is difficult to see in what respect they are too drastic.

It is necessary for the process hand to be able to carry out orders intelligently, to operate his plant efficiently, and to deal with emergencies when they arise, because usually there will be no time for the staff to intervene in the early stages. Here, in brief, is the list: The process worker must possess adequate physical energy and strength to stand up to his job; he must possess dexterity and handiness in manual work; he must be sufficiently accurate in using instruments; he must have a good judgment of time and must be punctual; he must be able to give attention to several processes that are going on simultaneously; his judgment must be good enough for him to distinguish between satisfactory and unsatisfactory conditions; his intelligence must permit him to grasp principles and to apply them in particular cases; he must be alert and capable of taking decisions when necessary; he must be able to remember instructions and to apply them; he must understand simple arithmetic; he must have sufficient mechanical ability to understand the working of the plant; he must be clean and tidy in his work and person; carefulness, thoroughness and concentration must be among his characteristics; he must be reliable and dependable; must possess self-confidence and some initiative; he must not lose his head or be easily disturbed either in normal times or during emergency; he must be able to co-operate with others; he must have keenness to do his work well. It is not suggested that in the new process hand one will find experience, but when experience comes with practice he will be doubly valuable.

This seems to be a counsel of perfection; the list in itself is sufficiently devastating to cause the subject to lose confidence in his own ability to perform what is expected of him. This discussion indicates, however, the growing standard that is expected in labour no less than in management.

It seems obvious to suggest that the steel trade should organise the storing of pig iron in lean times and draw on its store when demand is high. Such an arrangement would make it unnecessary to provide more pig iron making capacity than is required by the average demand.

—Sir Walter Benton Jones.

Notes and Comments

The Importance of the Coking Industry

A VERY good idea of the size of the coking industry, and the importance of its products, was conveyed by the speeches, the President's in particular, at last week's annual dinner of the Coke Oven Managers' Association. The industry contains slightly over 100 coking plants carbonising approximately 25 million tons of coal per annum (representing about a tenth of the coal raised in the country). The output of its principal product, coke, is largely influenced by the demands of the iron and steel industry and there were indications that there would shortly be an increased production of iron and steel and consequently of coke. The coke oven gas is supplied to gas and industrial undertakings by co-operation with the gas industry, and its main by-products, tar, creosote, ammonium sulphate, benzol, toluol, etc., find many outlets including, of course, the chemical industry. Benzol is one of the most important products and is very remunerative so far as coke ovens are concerned. The industry is producing at the present time about 70 million gallons of light oil from which 40 million gallons of rectified benzol are recovered. As Sir Thomas Inskip pointed out, the coking industry is vital to all armament schemes but, as the President perhaps more happily added, it is also of essential importance to the economic life of the country.

Synthetic Fibres from Artificial Resins

ATTEMPTS have long been made to produce fibres from synthetic resin products but, although several patents have been published describing the production of synthetic resin fibres by different methods, success has not been achieved on the commercial scale. It now appears, however, that E. I. du Pont de Nemours have produced a fibre of this type amenable to large-scale manufacture. According to the current issue of *Chemical and Metallurgical Engineering*, the new fibre is a thermoplastic polyamide resin, obtained from a diamine such as hexamethylenediamine and a dibasic acid such as adipic acid. Polymerisation is carried out at a temperature between 180° and 300° C. and the product dry spun from solution into a non-solvent. Cold-drawing greatly increases the strength and pliability of the filaments, which can be made of very low denier. It is said that during polymerisation and dry spinning oxygen has the effect of discolouring the product. These operations are therefore best carried out in an atmosphere of nitrogen. The finished fibre is said to have good elastic recovery, thus making it suitable for hosiery, high tenacity and a silky, lustrous appearance.

The Pessimists' Effect on Trade

IT is time the long-faced misery-makers were put in their place. It is quite true that they are an insignificant minority but, even if there is only one in a long street, he can be a great nuisance and, when he gets to his place of business, he can be a positive menace. Everybody knows the distinguishing badge of this misguided creature. He preaches the inevitability of war or, in the alternative, the collapse of British institutions and the destruction of the Empire. He made the recent crisis ten times more difficult for everybody else by his gloomy forebodings. When the cloud was dispersed by wise statesmanship, he became gloomier still and prophesied the onset of a more severe test under less favourable conditions in a few months' time at the latest. Trouble-brewers of this type can be dealt with individually. Unfortunately their bleatings have a certain cumulative effect, which spreads an indefinable anxiety among the rest, who in their hearts know better. Their jeremiads can have a particularly poisonous effect on the course of trade, which needs an atmosphere of confidence for its maximum development. There is every reason why British trade should flourish from now onwards until well into 1939. The summer nightmare of Central Europe has been removed. British security is absolutely unchallenged. The season of peace and goodwill is approaching. If the arguments of the Scrooges of 1938 were carried to their logical conclusions, they would be facing, with a resignation hardly distinguishable from equanimity, a war-time Christmas. A great part of the population has poignant memories of the Christmases of 1914, 1915, 1916 and 1917, and would do anything in reason not to go through the experience again. Christmas would not live up to its message of universal happiness if there were any setback in trade, with its inevitable sequel of increasing unemployment. Trade ought to be good in the next two months, and it is the duty of all patriotic citizens, so far as it lies in their power, to make it so.

Denunciation of the Faint-Hearts a High Duty

THIS is no time for suspending schemes of development or of contracting normal habits of buying. Neither of these defeatist tendencies can have a chance if the business community as a whole refuses to listen to the prophets of evil and makes a determined effort to maintain a cheerful atmosphere within the radius of its activities. The scare-mongering minority simply must not be allowed to upset Christmas trade. Neither the manufacturer nor the retailer seriously believes in the imminence of general war. They should proclaim their faith on every legitimate occasion. Let the pessimists have a courteous hearing by all means, but let them have a dose of reason, truth and sanity in return. An active minority can do a great deal of damage, but only if the majority do not take the trouble to grapple with them. This is a country which glories in freedom of discussion, and there can be no higher duty at the present time than for those who reject the horrible doctrine of the inevitable war to arise in their wrath and denounce the faint-hearts.

Increasing the Volume of Exports

THE desirability of increasing the volume of our export trade has been so often emphasised recently that it is almost with relief that one hears of something definite being done. In itself the extension of the activities of the Institute of Export by the opening last week of a branch in Birmingham to increase export-mindedness and export efficiency, was a welcome step. Important also was the announcement made by the Parliamentary Secretary of the Department of Overseas Trade when opening the branch that he was intending to bring the Department's services, and the assistance it could render, to the notice of industrialists through correspondence and personal consultation. He added, "one factor, and a very important factor, if we want to recover our former position of pre-eminence in the export trade, is that our individual industries must place themselves in a position to talk on terms of equality with corresponding industries abroad." This is putting a very heavy onus on industry. It is difficult to see how our industries can possibly, without definite Government support, place themselves in this position as regards those corresponding German industries, which have State aid in their export business.

Synthesis of Gaseous Hydrocarbons

Synthesis at High Pressure—Catalysts for Methane Synthesis—Papers at Research Meeting of Institution of Gas Engineers

THE 10th Autumn Research Meeting of the Institution of Gas Engineers was held on Tuesday and Wednesday of this week at the Institution of Mechanical Engineers, London, under the chairmanship of the President, Mr. Robert Robertson, M.Inst.C.E., M.Inst.G.E. During the two days of the meeting, fourteen reports and papers were presented and discussed; four of these in particular being of interest to the chemical industry also. Two are summarised or extracted below and it is intended to publish short summaries of the other two (namely the Institution Gas Fellowship Report, 1936-1938. " The Influence of Furnace Atmosphere on the Scaling of Mild Steel at Temperatures from 1,200 to 1,400° C " and the " 29th Report of the Refractory Materials Joint Committee ") next week.

SYNTHESIS AT HIGH PRESSURE

THE following is a summary of the 43rd Report of the Joint Research Committee of the Institution and Leeds University on " The Investigation of the Use of Oxygen and High Pressure in Gasification (Part III. Synthesis of Gaseous Hydrocarbons at High Pressure) presented on Tuesday.

The experiments described in the 41st report of the Joint Research Committee showed how gaseous hydrocarbons had been produced in quantity from non-caking coals and low-temperature cokes by heating them in a stream of hydrogen under pressure from about 600° to 800° C. Using the same apparatus as before, it has now been found that a considerably more extensive gasification can be obtained by hydrogenating up to temperatures above 800° C. At higher temperatures, the decrease of hydrocarbon formation with continued passage of hydrogen was much less pronounced and the treatment was usefully continued for a longer time. The best results were obtained by hydrogenating up to 900-950° C.

Coals, after a preliminary carbonisation at 450-500° C. to destroy their caking properties, gave yields between 500 and 600 therms per ton in gaseous hydrocarbons while the calorific value of the outgoing gases remained above 500 B.Th.U. per cu. ft. From 70 to 85 per cent. of the carbon in the coals was gasified and it is remarkable how the rate of hydrocarbon production was maintained towards the end of the experiments when only small amounts of material remained in the reaction tube.

High yields of gaseous hydrocarbons were also obtained when using coals directly without a preliminary heating. The fusion of the coal into one piece during the treatment did not appreciably interfere with hydrogenation in the small reaction tube used, although ill effects due to by-passing might have been expected. The percentage of residue was even less than with the coals which had been rendered non-caking.

Experiments have also been made on cokes prepared at temperatures as high as 800° C. With these, the advantage of increasing the final temperature of hydrogenation to 900° C. was especially pronounced. When hydrogenated up to 800° C., a temperature to which they had already been exposed during preparation, they gave a low yield of gaseous hydrocarbons but, with a final temperature of 900° C., the yield was not greatly inferior to that from coals and low-temperature cokes.

The results indicate that in a continuous plant, operated with replenishment of the fuel bed, coals and cokes prepared at temperatures up to 800° C. could be practically completely gasified in hydrogen at 50 atmospheres, if the temperature of the fuel bed were maintained around 900° C. and if, with coals, caking properties did not give rise to difficulties on the larger scale of operation.

It was found that the rate of gasification of fuels in hydrogen was accelerated by the presence of alkalies. So far, experiments have been made with sodium, potassium and barium carbonates, with particular attention to sodium carbonate as one of the cheapest alkalies available. The influence of the alkalies was most marked when hydrogenating coke at relatively low temperatures.

When hydrogenating up to 900° C., since all the fuels tested were readily converted into hydrocarbons without any addition, the influence of alkalies was less marked than at 800° C. There was still, however, an appreciable acceleration of hydrocarbon formation towards the end of hydrogenation and, as a consequence, gasification to completion was facilitated.

In view of possible mechanical difficulties which might arise on the large scale if the fuel cakes during gasification, it is noteworthy that the admixture of alkalies considerably reduced the caking of coals. Indeed, except in the case of strongly-caking coals, fusion and caking, even in hydrogen under pressure, were completely prevented by the addition of 3 per cent. of sodium carbonate.

There is evidence that the percentage of methane in the gas produced in some of the experiments on coke reached the maximum permitted by equilibrium. The highest percentages of methane obtained at 50 atmospheres were 57.3 at 800° C., 43.0 at 900° C., and 36.3 at 950° C.

A series of experiments has been made on the hydrogenation of coal using various rates of hydrogen supply at various rates of heating to the final temperature. The results can be best understood by making a broad distinction between two periods in the hydrogenation, viz., an initial period in which the coal was undergoing thermal decomposition while being raised in temperature and a final period in which the solid residue approached a condition of thermal stability at a steady temperature. During the final period, the rate of formation of hydrocarbons was limited and depended mainly upon what final temperature was maintained. During the initial period, however, it appeared that thermal instability conferred a high reactivity upon the coal and rapid rates of heating led to high rates of hydrocarbon production when using an adequate supply of hydrogen

Break-down of Six-membered Carbon Rings

Previous workers have found that coals contain aromatic constituents and that, on heating, the benzenoid structure becomes more pronounced in the solid residue. Thus, it follows that the complete gasification of coals in hydrogen to simple hydrocarbons such as methane involves the breaking down of six-membered carbon rings. Such break-down was demonstrated more directly by making experiments at 50 atmospheres on the hydrogenation of aromatic compounds of known composition, such as benzene, anthracene, and xylene. It was found that the conversion of benzene to gaseous hydrocarbons became appreciable at 750° C. The conversion was rapid at 850° C. when approximately two-thirds of the benzene was decomposed to methane in a time of about 1 min. Anthracene, with linked carbon rings, was more readily decomposed than benzene. Approximately one-third of the anthracene was converted to gaseous hydrocarbons at 650° C., and more than three-quarters of it at 800° C., again in a time of 1 min. With xylene there was an appreciable formation of methane as low as 550-600° C., presumably due to the early hydrogenation of the side chains. It appeared that the hydrogenation of the side chains was complete at 700° C., and that hydrogenation of the nucleus then began as with benzene.

In the 41st report it was shown that when fuels were heated

in hydrogen under pressure, the rate at which gaseous hydrocarbons were produced passed through two maxima, one at 500-550° C. and the other at 750-800° C. The experiments just mentioned suggest that the second maximum represented the hydrogenation of the basic six-membered carbon rings, the first being accounted for by the hydrogenation of side chains, chain compounds, etc.

Experiments with a Larger Apparatus

Some preliminary experiments have been made on a larger apparatus with a retort 4 in. in internal diameter, holding approximately 1 kg. of fuel over 10 in. of its length. The size of the apparatus was so chosen that the liquid products from coal would be sufficient in quantity for measurement and some examination, that heat liberated or absorbed during the reactions would be perceptible, and that effects caused by any caking of the charge could develop. The retort was supported vertically and hydrogenation started by passing hydrogen, preheated to 800-850° C., downwards through the charge.

When hydrogenating coals and low-temperature cokes at 50 atmospheres in this larger apparatus it was found that the reactions began when the upper layers of the charge reached 550-700° C. As expected, the reactions proved to be exothermic and the temperature of the reaction zone rose to 900-1,000° C. The rate of temperature rise was rapid, about 100° per min. The amount of heat evolved by the reactions could not be measured, but it was plain that it would be sufficient to maintain the reaction temperature when operating on a large scale. Usually, there was a general fall in temperature after the reaction zone had travelled through the charge, and then the reactions ceased suddenly. It appeared that, once the high reactivity induced by a rising temperature had passed, the rate of reaction was insufficient to maintain the temperature because of the excessive loss of heat from the comparatively small retort. In consequence, only the initial rapid evolution of hydrocarbons was obtained, the yields varying from 100 to 150 therms per ton. The fall in temperature and the cessation of the reactions did not occur, however, when the fuel contained a small percentage of sodium carbonate and it was then possible to continue gasification almost to completion.

With coals, approximately 15 gal. of light tar were produced per ton, and there was a high yield of ammonia, e.g., equivalent to 100 lb. of ammonium sulphate per ton.

Caking did not appear to interfere with hydrogenation any more than it did in the small reaction tube. This observation may prove to be of importance.

CATALYSTS FOR THE SYNTHESIS OF METHANE

IT was stated in a paper on "Complete Gasification of Coal and Methane Synthesis" presented by J. G. King, B.Sc., Ph.D., F.I.C., to the Autumn Research Meeting of the Institution of Gas Engineers on Tuesday that several programmes of investigations are in progress at the Fuel Research Station as part of the work of the Joint Committee of the Institution of Gas Engineers and the Fuel Research Board. From the standpoint of the gas industry these have been concerned with (i) the possibility of gasifying bituminous coals in water-gas plants, (ii) the use of catalysts suitable for the enrichment of low-grade gases by the synthesis of methane from the hydrogen and carbon monoxide contained in these, and (iii) the gasification of pulverised coal with steam and oxygen under pressure under conditions yielding a high output of town gas per unit of reaction space.

Dr. J. G. King, chief chemist, Fuel Research Station.

The paper was a progress report giving briefly the results which had been obtained and the following is an extract from the section of the paper dealing with catalysts for the synthesis of methane from carbon monoxide and hydrogen.

The catalysts most commonly used for the synthesis of methane, nickel and cobalt, are reputedly susceptible to poisoning by sulphur compounds, and in view of the difficulty of removing these completely from coal gas it has been suggested that they should be replaced by substances not susceptible to this poisoning.

Molybdenum Catalysts

Since J. J. S. Sebastian (*Carnegie Inst. Tech. Coal Res. Lab. Contr.*, 1936, 35) had shown that molybdenum sulphide could be used as a sulphur-resistant catalyst for this purpose the examination of other molybdenum catalysts under different conditions was undertaken.

In a typical experiment, Sebastian used 22 g. of a catalyst, supported on silica gel and containing 50 per cent. of molybdenum sulphide, for the treatment at atmospheric pressure of a gas mixture containing one volume of carbon monoxide to three volumes of hydrogen at a temperature of 450° C. and a rate of 2 l. per hr. Of the carbon monoxide treated, nearly 50 per cent. was converted to methane, about 30 per cent. to carbon dioxide, and the remainder was unchanged. The rate of gas flow was small, but the result was nevertheless promising.

Attempts were first made to reproduce Sebastian's results. The catalysts tested all showed some activity, but the results obtained were much inferior to those recorded by Sebastian. Pure, pelleted molybdenum disulphide appeared to be the most active catalyst.

It was decided to extend the work to the examination of the effect of high pressures, and experiments were accordingly carried out at pressures ranging from 20 to 200 atm. in a small, laboratory-scale converter normally used for the hydrogenation of oils. The amount of catalyst used was 25 ml. and the gas treated was a mixture of water gas and hydrogen containing about 20 per cent. of carbon monoxide. Two series of experiments were carried out, the first one at 400° C. with a pelleted molybdenum disulphide catalyst, and the second at 480° C. with a catalyst consisting of molybdenum sulphide supported on alumina gel. The higher reaction temperature was used with the supported catalyst since this was known to be the less active. The result of selected experiments are given in the table below:—

Pressure, Atm.	Rate of Residual Gas, Cu.ft. per Hr.	Alumina-gel-supported Molybdenum Catalyst.		Pelleted Molybdenum Disulphide Catalyst.	
		Total Conversion of CO, Per Cent.	Conversion to Methane, Per Cent.	Total Conversion of CO, Per Cent.	Conversion to Methane, Per Cent.
1	2	3	4	5	6
200	1	90.5	62.0	98.6	87.8
	5	67.7	42.9	47.3	32.0
	20	—	—	13.1	12.7
100	1	—	—	53.2	35.2
	2	57.9	26.8	35.4	24.8
	5	—	—	19.0	16.2
50	1	—	—	35.0	10.8
	2	32.0	11.4	15.9	8.4
	5	—	—	9.7	8.9
20	2	17.3	3.8	—	—

In general, the two catalysts gave similar results, although the supported catalyst was much less active. Initial and final experiments on the treatment of an oil showed that both catalysts had undergone a considerable loss of activity, the more active catalyst having deteriorated more rapidly.

In Sebastian's experiments the time of contact of the gas mixture, which is approximately proportional to the pressure, was of the order of 40 sec. With the amount of catalyst

employed in the present experiments (25 ml.), this time of contact corresponds to a throughput of about 15 cu. ft. per hr. at 200 atm., or 1.5 cu. ft. per hr. at 20 atm. The degree of conversion of carbon monoxide to methane, therefore, did not compare favourably with that obtained by Sebastian. A good conversion was obtained when the time of contact was very long, but the high pressures used did not enable sufficiently high throughputs to be obtained. Furthermore, in practically all the experiments there was a very considerable loss of carbon owing to the occurrence of side reactions.

In view of these unsatisfactory results, experiments on the synthesis of methane using molybenum catalysts were discontinued for the time being, and attention was directed to the possibility of producing nickel or cobalt catalysts in which the effect of poisoning by sulphur compounds could be reduced to a sufficient degree or even prevented altogether.

Since experience had been obtained in the manufacture of a promoted cobalt catalyst, attention was directed to this in preference to nickel. The composition of the prepared catalyst was Co 100, ThO_2 18, kieselguhr 100 parts by weight. A catalyst of this type is normally used for the synthesis of hydrocarbon oils at atmospheric pressure from mixtures of carbon monoxide and hydrogen at about 200° C., but at higher temperatures (300° to 350° C.) methane or carbon dioxide are produced according to the reactions.

(i) $CO + 3H_2 \rightarrow CH_4 + H_2O$
(ii) $CO + H_2O \rightarrow CO_2 + H_2$
(iii) $2CO \rightarrow C + CO_2$
(iv) $CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$

It was found that alteration of the H_2/CO ratio affected the degree to which CO_2 or H_2O was produced, a high ratio favouring the latter. It has been found that an increase of space velocity also affects the reactions in favour of reactions (ii) and (iii). As the space velocity increases, therefore, the ratio of CO_2 to CH_4 increases and imposes a limitation on the velocity that could be employed in practice.

The resistance of this catalyst to poisoning by sulphur compounds was next investigated. Both cobalt and nickel catalysts are reputed to be very susceptible, and Sebastian has shown that as little as 0.06 mg. of sulphur per g. of a nickel catalyst reduced the activity of this by 80 per cent.

In an experiment with the thoria-promoted cobalt catalyst, on the other hand, the activity was practically unaffected when H_2S was passed over it in such high concentration that in less than an hour H_2S appeared freely in the exit gas. As far as loss of activity is concerned, the general result has been observed that, when sulphur is being admitted to the catalyst during methane synthesis, the time of running is much more important than the quantity of sulphur admitted during that time.

Although it has been shown that sulphur compounds are apparently without effect upon the catalyst the activity of the latter does fall off slowly during the treatment of a gas containing a small quantity of sulphur. It now remains to continue the experiment and to discover, if possible, the reason for the deterioration of the catalyst with time. If this can be overcome it is felt that the present catalyst would be active enough for practical application.

Azeotropic Distillation in Industry*

By
H. GUINOT and F. W. CLARK, B.Sc., F.I.C.

AZEOTROPIC mixtures, binary and tenary, or, in other words, mixtures of constant boiling point containing two or three constituents have long been known. They are of two types, namely, those in which the boiling point of the mixture is:—

(*a*) lower than that of any of its constituents.
(*b*) higher than that of any of its constituents.

It seems to be a fair statement that the possibility of making practical use of azeotropic mixtures was not realised until Professor Sydney Young prepared absolute alcohol by making use of the ternary azeotropic mixture ethyl alcohol—benzene—water, the composition of which is: alcohol, 18.5 per cent.; benzene, 74.1 per cent.; and water 7.4 per cent. The boiling point of this mixture is 64.85° C. Professor Young carried out this work during 1902, using a discontinuous process.

It was not until the year 1923 that Backus, Keyes and Stevens in the U.S.A., and Guinot in France, almost simultaneously developed continuous processes for the manufacture of absolute alcohol, the ternary azeotropic mixure, ethyl alcohol—benzene—water being involved. This was the real starting point of all commercial development of azeotropic distillation processes. Since then hundreds of such plants have been installed, and to-day upwards of 40,000 hl. (880,000 gal). of absolute alcohol are produced daily by azeotropic processes.

The following facts, as determined by Young, are involved in the continuous processes, as they were in his discontinuous process, though entrainers other than benzene are used in certain cases.

(1) When the ternary azeotropic mixture (boiling point 64.8° C.) alcohol—benzene—water is distilled and condensed, it separates into two layers. The top layer represents 84 per cent. of the volume of the distillate and has approximately the following composition (at 20° C.): alcohol, 14.5 per cent.; benzene, 84.5 per cent.; and water, 1.0 per cent.

The lower layer, representing the remaining 16 per cent. of the mixture, has the following approximate composition: alcohol, 53 per cent.; benzene, 11 per cent.; and water, 36 per cent.

The composition of the layers varies greatly with the temperature of the decanted mixture. When this is effected at a temperature close to that of the boiling point of the azeotropic mixture, the volume of the lower layer is greatly diminished, but its water content is increased to almost 50 per cent.

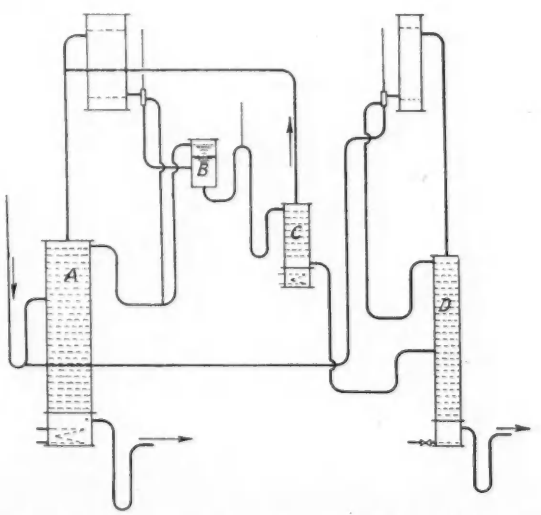

Fig. 1. Manufacture of absolute alcohol from 96% spirit.

* From a paper read at a meeting of the Institution of Chemical Engineers, on Tuesday.

(2) The binary azeotropic mixture benzene—alcohol contains 67.6 per cent. of benzene and boils at 68.2° C.

The process is carried out by passing the 96 per cent. alcohol, with the requisite quantity of entrainer, into Column A (Fig. 1). On heating by means of the closed steam coil shown, the ternary azeotropic mixture is formed at the head of the column while absolute alcohol is obtained at the base. In the intermediate zone a mixture of entrainer and alcohol containing only a little water is obtained. In theory the entrainer, which is added initially, serves indefinitely and is added in quantity sufficient to allow of rapid dehydration, but not in such excess that it contaminates the absolute alcohol produced. Actually it is necessary to make good the inevitable small losses of entrainer which occur, but the quantity involved should not exceed 0.05 per cent. of the volume of the absolute alcohol produced.

The vapours of the ternary azeotropic are condensed and passed in part to the decanter B, in which the mixture separates into two layers. The upper layer, rich in entrainer, is returned to the head of column A, and the lower aqueous layer is passed to a small column C, in which the entrainer is recovered (as azeotrope) and returned to the head of column A.

At the base of column C, aqueous alcohol is obtained and this is passed to column D at the head of which 96 per cent. alcohol is produced and passed to column A for dehydration. From the base of column D, water free from alcohol flows away.

Numerous liquids may be used an entrainers. Those which have been employed are benzene, trichlorethylene, cyclohexane, and, finally, certain special fractions of petroleum spirit. In practice the entrainer most generally used is a mixture of benzene and a petroleum spirit with a boiling range between 95° and 100° C. The successful use of the latter, despite its high boiling point, provides an example of the surprising results obtained when dealing with azeotropic phenomena.

By making certain modifications in the plant it is possible to produce absolute alcohol direct from distillery wash or fermented wines.

Manufacture of Ethyl Acetate

The process about to be described furnishes a characteristic example in which distillation processes contribute in influencing a reversible reaction in a favourable manner.

A still is charged with ethyl alcohol, containing a small quantity of a strong mineral acid as catalyst, and the mixture is boiled. An equimolecular mixture of ethyl alcohol and acetic acid is then added continuously, whereupon, owing to the large amount of ethyl alcohol present, ethyl acetate is produced almost instantaneously. The ethyl acetate and water produced by the reaction must be quickly removed, otherwise the reaction is slowed down and finally ceases.

To effect this removal the still is attached to a column A (Fig. 2) and in this the ternary azeotropic mixture, ethyl acetate—alcohol—water is built up. This mixture boils at 70.3° C. and has the following composition: Ethyl alcohol, 7.6 per cent.; ethyl acetate, 84.5 per cent.; and water, 7.9 per cent.

From this mixture it is impossible to obtain pure ethyl acetate by simple rectification. Instead, it is necessary to make use of a method called "hydroselection," which is carried out as follows:

The vapours of the ternary azeotropic mixture are passed into the centre of column B, into the top of which is led water at the temperature of 70.5° C., this being the boiling point of the binary azeotropic mixture ethyl acetate—water.

In this way ethyl acetate rises to the head of the column as the binary azeotrope, whatever may be the composition of the vapour mixture. It is quite different with the alcohol, as the composition of the vapours furnished by boiling a mixture of alcohol and water varies according to the alcoholic content of the mixture. In any case mixtures of alcohol and water cannot boil at a temperature below 78.3° C.

The wet ethyl acetate vapour from the head of column B is condensed and passed to a decanter, from which ethyl acetate containing 3 per cent. of water is passed to column C. Here the ethyl acetate is dehydrated, owing to formation of the binary azeotropic mixture, ethyl acetate-water, which contains 8.6 per cent. of water, and boils, as stated earlier, at 70.5° C. Anhydrous ethyl acetate is withdrawn from the base of the column.

The weak alcohol flowing from the base of column B is passed to column D and there concentrated to give 96 per cent. alcohol. This is returned to the still, and water containing a mere trace of acetic acid is run to waste from the base of the column.

By making modifications in the operation of the same plant other esters may be produced, for example, butyl and amyl acetates, ethyl, butyl and amyl formates, ethyl, butyl and amyl propionates, ethyl, butyl and amyl butyrates. In every case use is made of azeotropic mixtures.

Manufacture of Ethers

Certain ethers required in the chemical industry may be manufactured more easily by making use of azeotropic processes. For instance, isopropyl ether, which is in demand for use in the preparation of petrols of high octane number, is manufactured as follows:

A still fitted with a closed steam coil is charged with isopropyl alcohol and a quantity of sulphuric acid. When the mixture is boiled there is a progressive formation of isopropyl ether, but as the reaction is a reversible one, it is necessary to remove both water and isopropyl ether from the reaction mixture, otherwise equilibrium is reached and formation of the ether ceases.

Isopropyl ether boils at 68.7° C. and forms with isopropyl alcohol and water a ternary azeotropic mixture which boils at 65° C.; the alcohol boils at 82.4° C.

After condensation, the mixture is passed into a decanter and there separates into two layers. The lower layer is rich in water, so that the continual elimination of water formed in the reaction is assured. The upper layer consists mainly of isopropyl ether, with some alcohol and a little water. The pure ether is obtained from this mixture by "hydroselection," as in the case of ethyl acetate. Separation of the isopropyl alcohol is relatively simple, for the ether is only slightly soluble in water, whereas the alcohol is miscible with water in all proportions.

For continuous manufacture of the ether the plant required is similar to that used in the manufacture of ethyl acetate.

Concentration of Acetic Acid

As is well known, acetic acid may be separated from its aqueous solution by simple rectification, but in order to obtain a good separation, a column with many plates is necessary, and the steam consumption is high.

By using an auxiliary product, concentration of the acid is greatly simplified. The auxiliary product should be practically insoluble in water and should not form an azeotropic mixture with anhydrous acetic acid. Such products are ethyl acetate, ether, isopropyl ether, ethylene dichloride, and amyl acetate; all these are used. In this country, ethyl acetate is generally employed.

On ebullition the auxiliary product added to the dilute acetic acid entrains water as a result of the formation of the binary azeotropic mixture. After condensation of the vapours of this mixture, the distillate is passed into a decanter and there separates into two layers. The lower water layer is removed, and the upper layer, which consists of the entrainer with only a small quantity of water, is returned to the head of the column. Glacial acetic acid is obtained from the base of the column.

It must be pointed out that, although azeotropic methods for concentration of acetic acid have made great progress, they have latterly been largely superseded by others in which use is made both of azeotropic distillation and solvent extraction processes.

The problem of separating formic acid from its aqueous

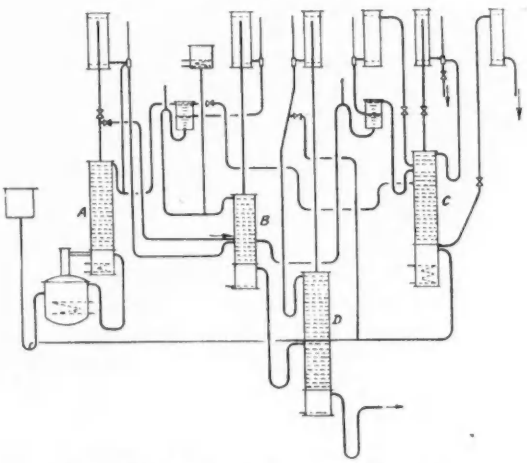

Fig. 2. Manufacture of ethyl acetate, etc.

solutions is worthy of note, for though it does not present, at least for the moment, great importance from the industrial point of view, it does provide a characteristic example of a product which gives rise to the formation of an azeotropic mixture of maximum boiling point.

Anhydrous formic acid boils at 100.8° C. under atmospheric pressure. In admixture with 22.5 per cent. of water it gives a distillate of constant composition boiling at 107.1° C., or approximately 7° C. higher than the boiling point of either pure formic acid or water. By a simple azeotropic distillation of a weak aqueous solution of formic acid, it is not possible to obtain an acid of greater strength than 77.5 per cent.

To succeed in obtaining anhydrous formic acid, it is necessary to add to the weak acid a solvent for formic acid. This solvent should be insoluble in water and be able to act as a carrier of water. The solvent used is butyl formate, which boils at 106° C.

Under these conditions the formic acid is dissolved in the solvent and subsequently the major part of the water is removed by the excess of solvent in the form of the binary azeotropic mixture, butyl formate—water, the boiling point of which is 83.6° C. The residue, consisting of the excess of solvent and formic acid of high strength, can then be distilled in order first to separate the solvent and, secondly, to rectify the formic acid, which is obtained finally in the anhydrous form.

Manufacture of Acetic Anhydride

The old methods for manufacture of acetic anhydride are carried out by allowing to react together such compounds as phosphorus oxychloride or sulphur chloride with alkaline acetates. These methods are being largely replaced in the first place by a method which involves the pyrolysis of acetic acid. This consists in passing acetic vapour, together with certain catalysts such as phosphates, through coils in a furnace heated to 650° C. Under these conditions acetic acid is partly converted to acetic anhydride and water; the mixture passing from the furnace has the following approximate composition: Acetic acid, 60 per cent.; acetic anhydride, 34 per cent.; and water, 6 per cent., with small quantities of volatile impurities.

Secondly, a process has been evolved in which acetic acid and acetic anhydride are simultaneously produced by oxidation of acetaldehyde. In this process mixtures of a composition similar to that given above are obtained. The problem is to separate the acetic anhydride from the water in such mixtures before these two combine to produce acetic acid. This may be carried out in the following way.

The mixture is at once passed into a column which is charged with ethyl acetate. This product removes water from the mixture owing to formation of the binary azeotropic mixture ethyl acetate—water, which, as stated earlier, boils at 70.45° C. and contains 8.6 per cent. of water. Recombination of acetic anhydride and water is in this way reduced to a minimum, due to the almost instantaneous removal of water and to the dilution of the original mixture by an inert solvent, which brings about, too, a considerable lowering of the boiling point.

The binary azeotropic mixture, ethyl acetate—water, obtained at the head of the column is condensed and decanted, the ethyl acetate separated being returned continuously to the upper part of the column, while at the base an anhydrous mixture of acetic anhydride and acetic acid is obtained. This is passed to a second column, in which, by simple rectification, the two products are separated. In this way recombination of acetic anhydride with water is reduced to less than 5 per cent. and pure acetic anhydride and glacial acetic acid are produced continuously from the original mixture.

Conclusion

Many more processes involving azeotropic distillation could be described, but it is hoped that those discussed indicate the industrial importance of this type of distillation and its wide scope.

The plant used is, in general, of standard type. In those cases where corrosion is a problem it is customary to displace all air from the plant by means of nitrogen. By this means corrosion is generally reduced to a minimum.

Finally, the importance of using pure raw materials and entraining agents is emphasised. If appreciable quantities of impurities are present in the feed of a plant run continuously, troubles are likely to arise. These are due as often as not to the accumulation in certain parts of the system of unwanted azeotropic mixtures, and, in order to deal with these, auxiliary plant will be required.

New Rapid-Drying Primers

Bakelite Resin Used as Base

THE production of priming coats capable of drying out completely within the short time of 20 minutes is said to be made possible by the development of new synthetic resin primer bases announced by Bakelite, Ltd. The importance of this development is appreciated when it is recalled that red lead or similar types of primers require a drying period of two days before a finishing coat can be added. These new Bakelite primer bases differ from ordinary varnishes or resin solutions in that they dry only by evaporation of their thinners without the necessity of oxidation, as is the method with ordinary primers, or heat polymerisation as adopted for stoving finishes. They deposit a coherent adhesive film which sets rapidly and almost immediately reaches a stage of inertness. The films obtained are not seriously softened, blistered or lifted by the subsequent application of nitrocellulose lacquers containing powerful solvents.

Quick through drying is obtainable with the new primer bases and case-hardening of the paint film is avoided. Absence of metallic driers prevents the paint film from becoming brittle with age as is common with very fast drying oxidising oil base films. In this respect the new coating compositions are similar to nitrocellulose or other cellulose ester lacquers although they differ from them in that the film is not dissolved or disrupted when additional coats are applied.

Bakelite primer bases are particularly suitable for embodying in primers for application to iron and steel. They can be employed also in the formulation of non-lifting, quick-setting, anti-corrosive primers for the treatment of galvanised iron, aluminium alloys, chromium plate and other non-ferrous metals.

THE Union Chimique Belge closed the year ending June 30 last with a slightly decreased net profit of 36.9 million francs (against 37.3 million) and again distributes a dividend of 19.5 francs per share.

Modern Textile Printing

The Development of Mixed Prints a Characteristic Feature

AT a meeting of the Manchester Section of the Society of Dyers and Colourists held recently, Dr. Hasse in a paper on modern printing expressed the opinion that every chemist would agree that we were at present in a wave of development of mixed prints. It might be considered that one-half of to-day's direct prints on cotton and artificial silk were composed of several dyestuff groups. Alongside the vats there might be found azo compounds of different types. The azo dyes of different composition were combined with chrome dyes, leuco esters of vats, and aniline black. These mixed prints showed another type of variety, according to the way in which the azo colours were applied to the fibre.

The application of the vats in printing showed very little change in comparison with, for example, the naphthol range. The largest part of this work was done with carbonate of potash and formaldehydesulphoxylate of sodium, and the use of soda-ash or caustic in place of potash formed exceptions.

A point of interest was the printing of half-shades in multi-colour designs in order to double the printed shades. A printing paste, consisting of titanium dioxide, albumen, tragacanth with an addition of Peregal OK was printed with the first roller in machine printing. The succeeding rollers in the pattern fell partly on the resist-printed spots, giving the half-tone effect. The same process was followed with the screen.

The rapid fast colours had the advantage of development by neutral steaming, but they had been neglected in favour of the Rapidogens, because the fast blues and navies were lacking in the rapid fast range. It had been the desire of printers for a long time to print the vat colours alongside the Rapidogens, but up to now the leuco compounds of the vats were partially destroyed by the action of the acid steam. A new method had been found to fix the Rapidogens by neutral steaming. The new process was effected by the addition of a volatile basic organic solvent called Rapidogen Developer N., to the printing colour. Caustic soda was no longer necessary in the printing colour which was very favourable for spun viscose and artificial silk.

Four different groups of dyestuffs of the naphthol range were now available for the printer. One of them had only been on the market for a short time, and in addition there was a valuable new method of development for the Rapidogen group which made it possible to combine naphthol dyes with other dyestuff groups to a greater extent than previously.

Dr. Hasse finally referred to the direct printing of acetate silk. Owing to the special properties of acetate silk, there was not much room for the selection of different dyestuff groups. The Celliton Fast colours gave clear prints in a good number of shades. Nowadays we had come nearer to the solution of the problem of brightness by the introduction of the new class of Astrazon colours, which were water-soluble dyestuffs.

NEW COAL UTILISATION EXPERIMENTAL STATION

The British Coal Utilisation Research Association has decided to establish an experimental station at West Brompton, London, where premises have been secured and are now being converted and equipped. Dr. D. H. Bangham, formerly Professor of Chemistry at Cairo University and Dean of the Faculty of Science, will be the senior member of the scientific staff, and will take charge of an important group of programmes connected with the use of coal; Mr. J. S. Hales will take charge of the domestic appliances department; and Mr. R. T. Hancock, formerly associate editor and contributor to *Kemp's Engineers' Handbook*, has been appointed head of the intelligence department and editor of the association's monthly bulletin.

Chemical Club

Annual General Meeting—A Need for Increased Membership

THE twentieth annual general meeting of the Chemical Club was held at 2 Whitehall Court, London, S.W.1, on Monday evening. Mr. J. Davidson Pratt, chairman of the executive committee, presided.

The report of the executive committee for the year 1937-1938 was presented by Mr. F. J. Bullen, honorary secretary. This showed that as compared with the previous year revenue was down by £34, and expenditure was up by £31. On the same basis of comparison the deficit on the year's working was £115, as against £50 last year. The main cause of decrease in revenue was a drop in membership. The loss of members through resignations and deaths was exceptionally heavy. The total decrease was 47. Thirty new members were elected, two members were re-installed, with the net effect that the membership on August 31, 1938, was 510. This was 15 less than at the corresponding date last year.

Constant attention had been given by the Committee to ways and means of enlarging the social side of the Club, which in their opinion was one of its most important functions. A further series of informal talks during the winter months was arranged by the Entertainments Committee; these were much appreciated both by members and guests. A club dinner was held on April 6, and was such a success that it was decided to hold three further less formal dinners.

Mr. Bullen said that the year under review had been a reasonably good one. Income could only be increased by an increase in membership and this could best be brought about by the efforts of individual members. Expenditure was already at a minimum, it could not be reduced further without interfering with the amenities of the Club. The committee aimed, in the current year, at a register of 600 members. It was thought that a wider knowledge of what the Club offered would bring the 600 total in sight. Not only does the Club offer all the masculine advantages of a West End Club at a very low rate of subscription, but its location in Whitehall Court entitles members and their ladies to enjoy the added amenities offered by the Court's restaurant and lounge; facilities for theatre bookings, squash, etc., etc., also exist.

The following officers were then elected for the ensuing year: President, Dr. W. R. Ormandy; chairman of executive committee, Mr. J. Davidson Pratt; honorary treasurer, Dr. S. I. Levy; honorary secretary, Mr. F. J. Bullen. Mr. F. H. Braybrook, Mr. T. W. Jones, and Dr. L. A. Jordan were elected to fill vacancies on the executive committee.

On the proposal of Mr. Davidson Pratt, Professor F. G. Donnan, a past president, was unanimously elected an honorary member of the Club.

BORATE deposits, conservatively estimated at 350,000 tons, have been discovered in the region of the Inder salt lake, U.S.S.R. The borates are generally in the form of lumps or veins, in the clay and gypsum soil. During the first eight months of this year 15,000 tons have been extracted, bringing the U.S.S.R. into second place in the list of borate-producing countries, and it is expected that within three years production will have increased to 60,000 tons per year.

TESTS carried out in Germany have shown that it is possible to produce citric acid from sugar on a commercial scale. The Ministry of Economics has pointed out that though the cost of production is much higher than if the acid were extracted from lemon juice, production could be made to pay if the factories were exonerated from taxation. This idea is under consideration in view of the fact that as German imports of citric acid and lemon juice for its preparation amount to over 2½ million RM. per year, home production of the synthetic acid would give a corresponding reduction in imports.

Coke Oven Managers' Dinner

Products of the Coking Industry of Vital Importance to Armaments and National Economic Life

THE 23rd annual dinner of the Coke Oven Managers' Association was held at the Hotel Victoria, London, on October 27, the chair being taken by the President, Mr. J. Curry. The guest of the evening was the Rt. Hon. Sir Thomas Inskip, K.C., M.P. (Minister for Co-ordination of Defence). The attendance was a record for the Association, the number present being about 250.

SIR THOMAS INSKIP, proposing "The Coke Oven Managers' Association," said that the Association was the body which might be said to have in the hollow of its hand the whole industry of armaments. If it were not for the success of coke oven undertakings all schemes for armaments would fail for want of supplies. Nevertheless, he hoped and trusted that the industry would not always be dependent upon armaments for, however strange it might be to say so at the present time, he did look forward to a period when at all events the scale of our armaments and also the armaments in other countries would be looked upon as characteristic of a world which had temporarily gone mad.

Continuing, Sir Thomas said that he had been impressed by the wide range of activities of the coke oven industry and their influence upon the work which he was supposed, he would not say to direct but to co-ordinate. The part which the coke industry played in connection with preparations for war was a most interesting example of the wide range of its activities.

THE PRESIDENT, responding, said that the coking industry during the past four years had enjoyed a fair measure and volume of trade but during the past six or eight months, due to unsettled conditions abroad, they had gone through a very lean time. However, signs were already showing that in a very short time there would be an increased production of iron and steel and consequently coke. Sir Thomas Inskip had mentioned the importance of the coking industry with regard to armaments but he personally held the view that the coking industry was of vital importance to the economic life of the country. As an industry they were responsible for carbonising approxmately 25,000,000 tons of coal per annum, or 10 per cent. of the total coal raised in the country, and apart from that, the raw product of the coking industry, *viz.*, coal, was responsible for giving employment in the mining industry to approximately 70,000 people all the year round.

The President then spoke on the question of research and said that research had been responsible for bringing the coke oven industry up to the very high standard it had attained to-day. In this connection he paid a tribute to the Research Associations for the very valuable work they had done and added that the Coke Oven Managers' Association was ready and willing at all times to co-operate with those associations for the further development of the industry.

MR. D. R. WATTLEWORTH proposed the toast of the guests, to which MR. GEORGE DIXON and MR. H. HASWELL PEILE responded

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The British Standards Institution has issued a revision of the specifications for carbolic and cresylic acids as follows: 515, carbolic acids 60's; 517, cresylic acids of high orthocresol content; 521, cresylic acid 50/55 per cent. metacresol; 522, orthocresol, metacresol and paracresol; 523, phenol; 524, refined cresylic acid.

These specifications lay down requirements as to the properties and purity of the materials, and specify limits for certain properties and impurities, such as specific gravity, crystallising point, residue on evaporation or on distillation, neutral oils and pyridine bases, alkalinity or acidity, and certain other special tests depending on the material specified.

Copies of these standards may be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d. (post free).

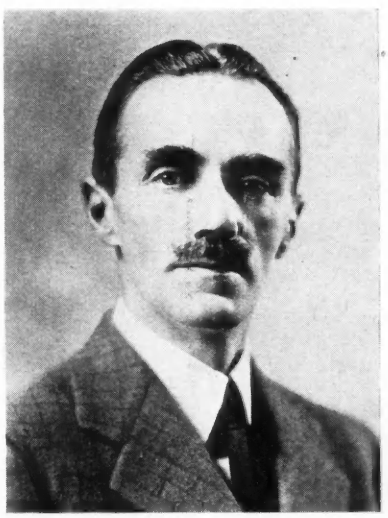
Directorship of Chemical Research Laboratory

Appointment of Dr. G. Stafford Whitby

DR. GEORGE STAFFORD WHITBY, Director of the Division of Chemistry, National Research Council, Canada, has been appointed by the Lord President of the Council to be Director of the Chemical Research Laboratory, Teddington, in succession to Sir Gilbert Morgan, F.R.S., who retired on September 30.

An Outline of Dr. Whitby's Career

Dr. Whitby, who is expected to take up his duties early in 1939, was born at Hull in 1887 and educated at the Royal College of Science, London. He studied chemistry under Sir William Tilden, graduating in 1906 with the Frank Hutton prize. He was subsequently demonstrator at the college until 1910, when he was appointed chief chemist to the Société Financière Des Caoutchoucs, Malay States. He was one of the first scientists to study the rubber industry, being engaged in rubber problems for more than fifteen years. He spent a considerable time on researches of a fundamental character dealing with the problems of vulcanisation, synthetic rubber



and colloid chemistry. In 1920 he published a book, "Plantation Rubber and the Testing of Rubber," and in recognition of his contributions to rubber research was awarded the first Colwyn Gold Medal of the Institution of the Rubber Industry, in 1928. He is a member and fellow of the Institution.

In 1917 he was appointed to the Department of Chemistry at McGill University, Montreal, and from 1923 to 1929 was professor of organic chemistry at the University. He was appointed Director of the Division of Chemistry when the laboratories of the National Research Council were established in Ottawa nearly ten years ago.

In 1928 Dr. Whitby had the distinction of Officer d'Academie conferred on him by the French Government, and in the same year he was elected President of the Canadian Chemical Association. He was President of the Canadian Institute of Chemistry from 1927-1928. He was editor of the rubber section of the International Critical Tables, associate editor of the Journal of the American Chemical Society, and in addition has published about ninety scientific papers dealing with the chemistry of rubber, colloid chemistry, etc. He was chairman of the Canadian Committee of the International Commission on Methods of Sugar Analysis.

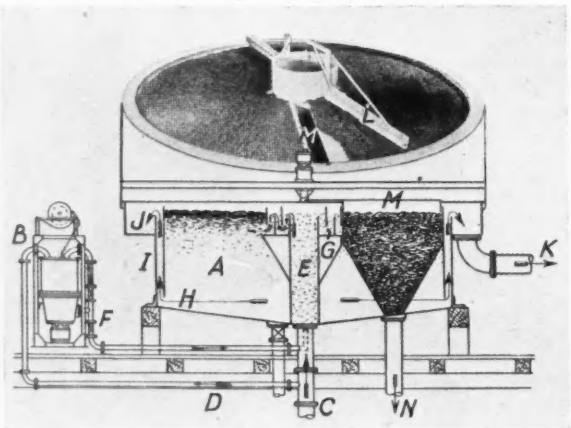
Dr. Whitby's degrees include B.Sc. (London), M.Sc., Ph.D. (McGill) and the honorary degree of LL.D. (Mount Allison). He is a Fellow of the Royal Society of Canada, and an Associate of the Royal College of Science.

Removal of Solids from Waste Water

New Apparatus for Mechanical Separation

AN apparatus for removing solid particles from waste water has been devised by the Maschinenfabrik Buckau R. Wolf A.G. of Magdebourg. It consists of a cylindrical tank (A) and of a foam producing apparatus (B). The foam producing apparatus is fed with a small amount of the waste water to be treated, which is taken from the main waste water feed (C) by the small pipe (D), the greater part of the waste water continuing directly on into the large diameter pipe (E) in the centre of the tank (A). In the foam producer the gas-producing chemicals necessary are mixed with the water, which is then pumped back again through the pipe (F) into the main stream of waste water as it enters the separator by the central pipe (E). The top of this pipe is slightly below the surface of the water in the tank (A) and is surrounded by three annular baffle plates (G) between which the water flows, so that the waste water coming from the pipe (E) is thoroughly mixed with that issuing from (F). Thus there is produced a multitude of tiny gas bubbles which tend to attach themselves to the solid particles in the water, causing them to rise.

Separation is effected in the tank where the water has a



relatively slow movement from the centre at the top where it enters between the baffle plates (G). The water escapes through an annular slit (H) at the bottom of the tank into an annular chamber (I) surrounding the tank and ending at the top in a trough (J) in which the water collects and from which it is run off by a pipe (K).

The solid matter on the surface of the water in the tank is collected by a slow moving revolving scraper (L) so placed that it will skim the surface of the water. At one side of the tank is a radially arranged trough (M) which is provided with a discharge pipe (N). As the scraper collects the solid matter floating on the surface of the water, it pushes it along until it reaches the trough into which it falls and is carried away. Two scrapers placed 180° apart prevent the formation of too thick a layer of solid matter.

The speed of operation of the apparatus depends on the fineness of the solid matter in the waste water, as well as on the amount of solids which may vary from about 0.02 to 0.2 per cent. in most waste waters. The quantity of water treated will range from 3 to 7 cubic metres per sq. metre of tank surface per hour. Sizes from 1½ to 6 sq. metres are provided, giving a capacity of treatment of as much as 9,000 gallons of waste water per hour.

LA Biologie Industrielle, registered in Paris with a capital of 400,000 francs, is interested in the development of biochemical processes for the manufacture of nitrogen and its compounds from organic matter.

Recent Trade Literature

A comprehensive folder dealing with their various products has been issued by the AUTOMATIC COIL WINDER AND ELECTRICAL EQUIPMENT CO., LTD. It forms a convenient guide to the Avo series of electrical testing instruments, and gives details of the Avo light-meter, various types of electrical measuring instruments, valve testing holders, exposure meters, etc.

Indicating thermometers with dials ranging from 4 to 13 in., with vertical edgewise scales, are briefly described in folder No. 65 of the CAMBRIDGE INSTRUMENT CO., LTD. The capillary tubing used with these thermometers is of a patented construction which can be supplied in lengths up to 120 ft. without the need for any form of temperature compensation. Combined indicating and recording patterns can be supplied. It is stated that over three million "Cambridge" temperature recording charts are used annually.

Cast-iron pipes which are lined with concrete are a notable product of the STAVELEY COAL AND IRON CO., LTD. The lining of these pipes is smooth and hard and adheres tenaciously to the iron. Such pipes can be used to convey water and also works effluents, but tests would undoubtedly reveal many cases where they might be applied in particular to the problems of a chemical works. A recent leaflet describes the process adopted in applying the concrete to the interior of the pipe. Cast-iron pipes, both sand-spun and vertically cast, are also supplied with a coating of bitumen to give greater corrosion resistance in contact with the soil.

Instrument equipment as applied to the modern boiler plant is well illustrated in publication No. 868/1,037 of GEORGE KENT, LTD. Not only are complete installations shown, but the individual instruments are also separately shown alongside particulars of their use and performance. It may be a matter of interest to know that recessed canopy panels with concealed floodlighting can be supplied where conditions make such an installation desirable. The "Multelec" for the measurement of temperature, *p*H, carbon dioxide and electrolytic conductivity, is one of the instruments mentioned, further details of which are given in supplementary publications. Publication No. 872/238 deals with carbon dioxide measurement by the thermal conductivity principle using the "Multelec."

Numerous illustrations of water softening plant working on the Kennicott system are given in a brochure issued by JOHN THOMPSON (KENNICOTT WATER SOFTENERS), LTD. The chemistry of water softening is explained in detail and many of the illustrations of installations are supplemented by a detailed layout in line to show the smaller details of the plant from the point of view of erection as well as operation. On page 36 there is a special reference to the removal of oil from water, it being pointed out that there is nothing more dangerous than the presence of oil in the feed water of a boiler and defects and damage traceable to oily feed water have now become so common—especially in modern high pressure boilers—that insurance companies show notable discretion in accepting the risk of covering insurance.

The F. J. STOKES MACHINE CO., U.S.A., the British representatives of which are Apex Construction, Ltd., have issued a new catalogue dealing with their pharmaceutical equipment which gives details concerning the Stokes tablet machines, auxiliary equipment, and tube, jar and powder fillers. Within the past few years all the Stokes single punch and rotary machines as well as auxiliaries have been redesigned, and exclusive features added. All the tablet machines are now available for compact, electric motor drive through V belts, and a new type of variable speed drive is available in motor driven models. The machines have all been redesigned on modern lines and built of steel and semi-steel construction. Dust guards now completely enclose the clutch, drive gears, bearings, worm box, punches, cams and pressure rolls.

Personal Notes

MR. ARCHIBALD CAMPBELL COLQUHOUN, chemical manufacturer, Appin Bank, Carnoustie, left £2,458.

MR. JOHN C. WEIR, of Glasgow, has been appointed a director of the Saturn Oxygen Co., Ltd., Hillington, Glasgow.

MR. H. PRENTICE has been appointed assistant chemist at the Anglo-Iranian Oil Co. refinery at Abadan, Iran. For some time he has been in the chemistry department of Briggs, Ltd., Dundee and Arbroath.

MR. ARTHUR H. RADASCH, former professor of chemistry at Alfred University, Alfred, New York, has been appointed head of the department of chemical engineering at Cooper Union with the rank of professor.

MR. J. E. HURST, a director of Sheepbridge Stokes Centrifugal Castings Co., Ltd., and past president of the Institute of British Foundrymen, was, at a meeting in Warsaw recently, elected active president of the International Committee for Testing Cast Iron.

Mr. F. M. K. Kielberg, chairman and managing director of the United Molasses Co., has been elected to the board of Tate and Lyle, Ltd. Mr. Kielberg is also on the board of several other companies, including that of the Distillers Co.

COUNCILLOR DAVID RICHARDS, Swansea's new Mayor, was last week-end presented with his robes of office by Imperial Chemical Industries, Ltd. The company made the presentation as a personal tribute to Councillor Richards, who was employed in the company's copper works for over 40 years. The presentation was made by Mr. A. M. Kempson.

DR. WALTER S. LANDIS has been elected to receive the Perkin Medal of the Society of Chemical Industry for 1939 for his work on cyanamide, derivatives of cyanamide, fertilisers, the first commercial production of argon and contributions to the explosive industry. The selection is made by a committee representing the five chemical societies in the United States.

DR. J. V. N. DORR, president of the Dorr Co., Inc., was presented with the Chemical Industry Medal of the Society of Chemical Industry at a joint meeting of the American Section of the Society and the American Chemical Society yesterday (Friday). The medal is awarded annually for valuable application of chemical research to industry and was given this year to Dr. Dorr in recognition of his inventions and subsequent world wide introduction of apparatus and processes in many chemical, metallurgical and sanitational operations which have made possible low cost production on a large scale.

MR. CHARLES JOHN WALSH, managing director of Appleby-Frodingham Steel Co., a subsidiary of United Steel Companies, has been appointed a director and assistant managing director of the latter concern.

MR. J. CURRY was elected president of the Coke Oven Managers' Association at the Association's annual meeting on October 27. MR. T. A. LONG was elected vice-president, MR. P. B. NICHOLSON, hon. treasurer, and MR. F. WHITE, hon. secretary.

DR. D. H. BANGHAM, formerly Professor of Chemistry at Cairo University and Dean of the Faculty of Science has been appointed senior member of the scientific staff at the experimental station which the British Coal Utilisation Research Association has decided to establish at West Brompton, London.

DR. W. R. ORMANDY was elected President of the Chemical Club for the ensuing year at the annual general meeting of the club on Monday. MR. J. DAVIDSON PRATT was elected Chairman of the Executive Committee, DR. S. I. LEVY honorary treasurer, and MR. F. J. BULLEN, the honorary secretary.

OBITUARY

MR. JAMES KAY, who retired from the gas managership of the burgh of Elgin in 1929 after 30 years' service, died on October 26 at the age of 79.

MR. EDWARD BROTHERTON-RATCLIFFE, founder of the firm of Brotherton-Ratcliffe and Co., Ltd., chemical merchants, Old Broad Street, London, and a director of Brotherton and Co., died on Sunday at the age of 53.

MR. DAVID TINNION, chairman of the firm of Henry Kenyon and Co., Ltd., chemical manufacturers, of Bank Quay, Warrington, died on October 27, at the age of 80. For 50 years he was a member of the Royal Exchange, Manchester,

The late Mr. David Tinnion.

and he was a member of the Liquor, Chloride and Zinc Association. A Freeman of Warrington, he was "father" of Warrington Town Council, having been a member since 1895. He was elected an alderman in 1905 and a borough magistrate in 1904. He was mayor of Warrington in 1927-8.

WORK by Russian bacteriologists has shown the possibility of replacing nitrogen fertilisers by a culture of azotobacteria. These bacteria live in the soil and provide constant supplies of nitrogen fertilisers. Experiments in their use over an area of a quarter million acres have shown them to be most effective.

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Inorganic

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Organic

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Lactic acid esters. Kümmel, *Farbe u. Lack,* 1938, 449-450.

Photolysis of organic acids. Bauer, Gloor and Künzler, *Helv. Chim. Acta, 21,* 1,038-1,052.

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Analysis

Detection of alcohol in pharmaceutical liquids. Bambach, *Ind. Eng. Chem. analyt. ed., 10,* 541-543.

Palladium tube in gas analysis. Fleiger, *Ind. Eng. Chem. analyt. ed., 10,* 544-547.

Titration method for determining fluorides and silicofluorides. Geffchen and Hamann, *Z. analyt. Chem., 114,* 15-20.

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Determination of α-cellulose in woody substances. Kürschner *Papier Fabrik. (techn. Teil), 36,* 389-393.

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Determination of aneurin (vitamin B_1). Slotta and Neisser, *Ber., 71,* 1,984-1,986.

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Coalgas poisoning and the combustion properties of the gas. Schuster, *Brennstoff Chem., 19,* 357-359.

Cellulose, Paper

Effect of alkalies on chemically modified cotton celluloses. Davidson, *J. Text. Inst., 29,* 195-218.

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Nitric acid pulping. Whittmore, Reid and Lynch, *Ind. Eng. Chem., 30,* 1,192-1,198.

Chlorination of plant substances. Müller and Stalder, *Papier Fabrik. (techn. Teil), 36,* 405-411.

Experimental multiple stage bleaching. Parsons and Jackson, *Paper Trade J., 107,* No. 14, 37-40.

Properties of cellulose derivatives: ethyl cellulose. Bluma, *Rev. Générale Matières Plastiques, 14,* 245-249.

Bleaching, Dyeing, Finishing

Woolfats and preparations thereof in wool treating. Jochum, *Melliand Textilber., 19,* 807-809.

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Chemical corrosion of glasses. Gefchen and Birger, *Glastechn. Ber., 16,* 296, 304.

Obtaining clay earths from clay, kaolin and other silicic acid-containing aluminium minerals. Machu, *Metall u. Erz., 35,* 499-510.

Effect of glass colour on setting rates. Burch and Babcock, *J. Amer. Ceramic Soc., 21,* 345-351.

Failure of coke-oven walls by reaction with coal ash. Rueckel, *J. Amer. Ceramic Soc., 21,* 354-360.

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Metals, Electrometallurgy

Oxidation-resistance in copper alloys: production of resistant films. Price and Thomas, *Metal Ind., 53,* 413-416.

Sodium-lead alloys by carbon reduction. Putnam, *Ind. Eng. Chem., 30,* 1,138.

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Raw materials for the newer detergents. Mullin, *Soap, 14,* No. 10, 21-23.

Paints, Pigments

Effect of corrosion on the durability of paint films. Darsey, *Ind. Eng. Chem., 30,* 1,147-1,152.

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Colour measurement and specification. Razek, *Paint Varnish Prod. Manager, 18,* 332-336.

Aluminium lacquer colours. *Farben Ztg., 43,* 1,115-1,116.

Rubber, Plastics, Resins

Latex in industry: new types of latices. Stern, *Rubber Age, 19,* 235-237.

The large molecule. *Rubber Age, 19,* 222-223, 239.

Catalysts in the manufacture of phenol-formaldehyde condensation products. Seebach, *Fette u. Seifen, 45,* 509-511.

Temperature and the oxidation of rubber. Ingmanson and Kemp, *Ind. Eng. Chem., 30,* 1,168-1,173.

Oil resistance of synthetic rubbers. Rohde, *L'Ind. Chim. Belge, 9,* 446-449.

Miscellaneous

Absorption of carbon dioxide by aqueous solutions of organic bases and salts. Guyer and Pürner, *Helv. Chim. Acta, 21,* 1,337-1,344.

Centrifugal pumps. Labour, *Ind. Eng. Chem., 30,* 1,105-1,109.

Drying and air conditioning. *Ind. Eng. Chem., 30,* 1,119-1,137.

From Week to Week

THE EMPIRE EXHIBITION, Glasgow, closed last Saturday. There was a record attendance on the last day of 364,092 which exceeded Wembley's last day record of 321,232, and brought the total for the six months up to 12,593,232.

PROFESSOR SIR ROBERT ROBERTSON, when responding to a toast at the dinner of the Glass Sellers' Company on October 28, referred to the various ways in which the glass industry had progressed. He produced a length of fishing line made of glass which he described as the latest achievement.

THE HARCOURT BUTLER TECHNOLOGICAL INSTITUTE, CAWNPORE, has undertaken important experimental work for the grade standardisation of oilseeds and oils; the constitution of oils from Nageshwar oil, and linseed oil from various types of linseeds produced in India. Research on the direct determination of solubility of soaps in water and on the rectification of orange oil from the North-Western Frontier Province is also being carried out.

AT AN INQUEST at Manchester, on October 27, on G. Collins, a chemical worker, employed at the Imperial Chemical Industries works, Blackley, Dr. F. H. Scotson said the man died from peritonitis and it was impossible to exclude his work in the chemical industry from the cause of death. Dr. William Susman, pathologist to the Manchester Royal Infirmary said this form of cancer was common to chemical workers. A verdict of accidental death was returned.

IN THE FIRST SIX MONTHS OF 1938 Algeria exported 1,388,675 tons of iron ore, compared with 1,376,195 tons for the same period of 1937; 4,052 tons of lead ore (against 4,375); 6,931 tons of zinc ore (against 7,719); 1,010 tons of antimony ore (against 452); 6,822 tons of manganese ore (against 5,505); 148,733 tons of phosphates (against 201,616), 4,350 tons of sulphur (against 3,629), and 7,332 tons of kieselguhr (against 6,496).

THE CELANESE CORPORATION OF AMERICA AND E. I. DU PONT DE NEMOURS AND CO., have completed plans for building large plants for the manufacture of synthetic fibres intended chiefly for hosiery knitting. The du Pont company is about to spend $7,000,000 for the building of a plant near Seaford (Delaware) and the Celanese company $10,000,000 for a plant near Pearlsburg (Virginia). It is expected that each will be able to start on commercial production in about a year's time.

A MEMORIAL SERVICE FOR SIR ROBERT MOND was held on Wednesday at the West London Synagogue of British Jews. Those present included: Sir William Bragg, Mr. W. A. S. Calder, Professor F. G. Donnan, Dr. H. J. Emeleus, Major F. A. Freeth, Mr. Herbert Gibbon, Mr. H. A. Humphrey, Dr. R. Lessing, Mr. W. Lloyd Willey, Viscount Leverhulme, Dr. Stephen Miall, Mr. Philip C. Pope, Mr. Richard B. Pilcher, Sir Robert Robertson, Professor Rideal, Mr. Albert W. Tangye, Professor Jocelyn F. Thorpe, Mr. A. Van den Bergh and Mr. A. E. Wallis.

A WEEK'S COURSE from November 14 to 19, has been arranged by the National Institute of Industrial Psychology for employment managers and others who administer selection tests. It is planned to be helpful to officials who have applied such tests for some years as well as those new to the job. In a short course, naturally, only a broad survey of the subject can be given; but it will be treated throughout from a strictly practical point of view to enable firms to make the best use of psychological knowledge when selecting staff. The course will be held at the Institute daily from 10.30 a.m. to 1 p.m., and 2.30 to 5.30 p.m. (Saturday 10.30 to 12.30). The fee for the week's course will be seven guineas which will include lectures, discussions and practical work. In addition it is hoped to arrange visits to staff and employment departments. Application should be made as soon as possible to the secretary, National Institute of Industrial Psychology, Aldwych House, London, W.C.2, from whom further particulars can be obtained.

FOURTEEN CANDIDATES have been nominated for the presidency of the American Chemical Society. They are: Erle M. Billings (business and technical personnel director, the Eastman Kodak Company, Rochester, N.Y.); Professor H. S. Booth (Western Reserve University, Cleveland, Ohio); Gustav Egloff (director of research, the Universal Oil Products Company, Chicago); Gustavus J. Esselen (president, the Gustavus J. Esselen, Inc., Boston); Francis C. Frary (director of research, the Aluminium Company of America, New Kensington, Pa.); Per K. Frolich (director of Chemical Laboratories, the Standard Oil Development Company, Elizabeth, N.J.); Professor Harrison Hale (University of Arkansas); Professor W. D. Harkins (University of Chicago); Professor Samuel C. Lind (dean of the Institute of Technology, University of Minnesota); E. Emmet Reid (emeritus professor of chemistry, John Hopkins University); Walter A. Schmidt (president and general manager, the Western Precipitation Company, Los Angeles); Professor Hugh S. Taylor (Princetown University); Ernest H. Volwiler (vice-president, Abbott Laboratories, Chicago); Professor Hobart H. Willard (University of Michigan).

TWO BUILDINGS, HOUSING A LABORATORY AND OFFICES, were damaged when fire broke out at the Belper (Derbyshire) oil works of Dalton and Co., on October 30. The flames were prevented from spreading to a large store of oil in the refinery.

THE INTERNATIONAL AND ABERCRAVE COLLIERIES, owned by Amalgamated Anthracite Collieries, Ltd., were found to be uneconomic unless the lower veins of coal could be developed. This the company found too expensive to contemplate, but the Nuffield Trust has offered to contribute £30,000 to the £50,000 fund required to save the two collieries.

THE CONCLUSION OF A CONTRACT between the Italian firm Azienda Generale Italiana Petroli, Rome, and the Mexican Petroleum Department is announced. It is understood that the Italians, with Mexico's refusal to barter oil for raw materials, especially those for the artificial silk industry, have agreed to pay cash for 5,000,000 barrels of oil at a dollar a barrel.

OVERSEAS BUYERS who are attending the 1939 British Industries Fair, from February 20 to March 3, will be granted temporary honorary membership of seven London clubs. The following will be open to men buyers, their wives and women buyers: English Speaking Union (buyers from the Empire countries and the United States); Royal Empire Society and Overseas League (buyers from Empire countries). Clubs open to men buyers only: Royal Automobile Club (buyers from any Empire or foreign country); Connaught Club (buyers from the Empire countries, United States, Norway, Sweden and Denmark); and British Empire Club (buyers from Empire countries only). The Forum Club will welcome women overseas buyers and the wives of overseas buyers.

THE I.C.I. STAND AT THE PUBLIC HEALTH EXHIBITION which will be held at the Agricultural Hall from November 14-19, will demonstrate the value and versatility of chlorine as a sterilising agent. Chlorine's ability to destroy any bacteria cheaply, quickly and safely, has led to its widespread adoption by public health authorities for the treatment of drinking water, swimming bath water and industrial water. The value of chlorine as an assistant at every stage of sewage disposal will be suggested by a display. The stand will also contain various displays of "Chloros"—the disinfectant, cleanser, and deodorant, which is a cheap and convenient source of chlorine for general disinfectant purposes. The part played by I.C.I. chemicals in the important public health field of pest control will be illustrated by two exhibits: "Termex," and I.C.I. British HCN.

New Companies Registered

Jones and Riley (Chemists), Ltd. 345,746.—Private company. Capital £600 in 600 shares of £1 each. To carry on business as manufacturers of and dealers in chemicals, gases, drugs, medicines, etc. Directors: Frank A. A. Jones, 40 Commercial Road, Leeds, 5; Reginald A. B. Riley. Registered office: 2 Victoria Road, Guiseley, near Leeds.

M.K.G. Developments, Ltd. 345,501.—Private company. Capital £100 in 100 shares of £1 each. To carry on all kinds of research in connection with organic chemicals and other substances and the making and perfecting of processes relating thereto: chemists, etc. Subscribers: E. Edwards, 4 Mayfair Avenue, Whitton, Middlesex; G. A. Smith.

Adpreg, Ltd. 345,391.—Private company. Capital £2,000 in 2,000 shares of £1 each. To carry on the business of manufacturers and importers of and dealers in glues, glue stocks, gum, pastes and adhesives of all kinds; chemical manufacturers, etc. Subscribers: Roy M. Ballantyne, 8 Thistley Close, Newcastle-on-Tyne, Wm. G. Gibson.

E.S.C. Laboratories (Liverpool), Ltd. 345,445.—Private company. Capital £300 in 300 shares of £1 each. To carry on the business of pharmaceutical, manufacturing, dispensing and analytical chemists, druggists, etc. Subscribers: Archibald Gill, "Birkland," Silver Birch Way, Lydiate; Nellie Robinson. Registered office: 81 Dale Street, Liverpool.

Unichem, Ltd. 345,427.—Private company. Registered October 20. Capital £1,000 in 1,000 shares of £1 each. To carry on the business of wholesale, retail and manufacturing chemists, druggists, etc. Subscribers: Frederick Cherry, 65 High Street, Walton-on-Thames; Thos. W. Cleave, Cecil H. Foster, Ernest Skues, David A. Rees, Arthur G. Wrench. Registered office: 219 Upper Tooting Road, S.W.17.

Anmac Products, Ltd. 345,687.—Private company. Capital £100 in 100 ordinary shares of £1 each. To carry on the business of manufacturers, importers and exporters of and dealers in chemicals and chemical preparations, acids, deodorants, cleansing compounds, boiler fluids, etc. Directors: Annie MacDonald, 61 Seedley Road, Salford, Manchester; John Stanley MacDonald, Alfred Thos. Hester, Bernard Reynolds Willcox. Registered office: 11a Abbey Estates, Mount Pleasant, Alperton, Middlesex.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

ACTIVATION OF SILVER CATALYSTS.—Carbide and Carbon Chemicals Corporation. (United States, Oct. 30, '37.) 29757.

MANUFACTURE OF PLASTIC COMPOSITIONS.—H. Carroll. (France, Oct. 15, '37.) 30042; (France, June 21.) 30043.

PRODUCTION, ETC., OF HIGH OCTANE BLENDING NUMBER LIQUIDS from the gases obtained in the distillation, etc., of carbonaceous materials.—Chemical and Petroleum Investments, Ltd., and L. A. Wilshere. 30242.

PRODUCTION OF METACRESOL.—A. M. Clark, and Imperial Chemical Industries, Ltd. 30056.

MANUFACTURE OF CELLULOSE DERIVATIVES.—H. Dreyfus. 29988.

MANUFACTURE OF TITANIUM PIGMENTS.—E. I. du Pont de Nemours and Co. (United States, Nov. 2, '37.) 29859.

SEPARATION OF POLYMERISABLE ORGANIC COMPOUNDS.—E. I. du Pont de Nemours and Co. (United States, Oct. 15, '37.) 30069.

MANUFACTURE OF PRECIPITATING AGENTS FOR DYESTUFFS, ETC.—B. Gaspar. 29672.

MANUFACTURE OF MAGNESIUM.—H. L. Gentil. 30041.

MANUFACTURE OF BERYLLIUM COMPOUNDS from their earths.—Ges. zur Verwertung-Chemisch Technischer Verfahren, and R. S. Opatowski. (Italy, Oct. 13, '37.) 29725.

SEPARATING MIXTURES OF SOLID SUBSTANCES.—H. E. Girling (Legal representative of H. D. Elkington) (Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij). (May 29, '37.) 29673.

MANUFACTURE, ETC., OF COMPOSITIONS containing synthetic rubber-like materials.—R. F. Goldstein, B. J. Habgood, D. McCreath, and Imperial Chemical Industries, Ltd. 30177.

MANUFACTURE OF CAPILLARY-ACTIVE COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) (April 27, '37.) 30005, 30006, 30007.

SENSITISING SILVER HALIDE EMULSIONS.—W. W. Groves (I. G. Farbenindustrie.) (April 22, '37.) 30136.

WOOD PULP FOR CHEMICAL USE.—Hercules Powder Co. (United States, Dec. 9, '37.) 30266.

EXTRACTION OF PHENOLS from aqueous solution.—I. G. Farbenindustrie. (Germany, Oct. 14, '37.) 29848.

MANUFACTURE OF PHTHALOCYANINE SULPHONAMIDES.—I. G. Farbenindustrie. (Germany, Oct. 14, '37.) 29849; (Germany, Sept. 24.) 29850.

POLYMERISATION OF OLEFINES.—I. G. Farbenindustrie. (Germany, Oct. 20, '37.) 30030.

MANUFACTURE OF BUTADIENE FROM BUTANE.—I. G. Farbenindustrie. (Germany, Oct. 20, '37.) 30031.

ALUMINIUM ALLOYS.—H. Mahle. (Germany, Oct. 29, '37.) 30107.

MANUFACTURE OF HETEROCYCLIC COMPOUNDS.—May and Baker, Ltd., A. J. Ewins, and G. Newbery. 30010.

METHOD, ETC., OF THE CONTINUOUS SAPONIFICATION OF FATS, ETC., by means of water.—H. Moltchanova (Legal representative of J. Grosjean), and P. R. E. Lewkowitsch. 30070.

MANUFACTURE OF AN ALDOL CONDENSATION PRODUCT from carbonyl compounds.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (May 31.) (United States, June 12, '37.) 29866.

PROCESS FOR REMOVING WEAKLY ACID COMPONENTS from hydrocarbon distillates.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Nov. 1, '37.) 29914.

DERIVATIVES OF STEROIDS, ETC.—Naamlooze Vennootschap Organon. (Holland, Oct. 16, '37.) 30049.

ZINC ALLOY.—P. Oakley. 30208.

TREATMENT OF LIQUID DISTILLABLE CARBONACEOUS MATERIALS containing solid matter in dispersion with hydrogen.—H. E. Potts (Naamlooze Vennootschap Internationale Hydrogeneeringsoctrooien Maatschappij). 30080.

ALCOHOLYSIS OF POLYMERISABLE ESTERS.—Rohm and Haas, A.-G. (Germany, Oct. 13, '37.) 29716.

RECOVERY OF IRON, ETC., from pyritic ores.—H. A. Sill. 29717.

PRODUCTION OF SULPHUR, ETC.—H. A. Sill. 29943.

CATALYST REGENERATION.—Standard Oil Development Co. (United States, March 17.) 29680.

SEPARATION OF OLEFINES from hydrocarbon mixtures.—Standard Oil Development Co. (United States, March 29.) 29852.

TREATMENT, ETC., OF GASOLINE HYDROCARBONS.—Texaco Development Corporation. (United States, Oct. 15, '37.) 29682.

PRODUCTION OF HARDENED ARTIFICIAL-RESIN PRODUCTS.—Albert Products, Ltd. (Germany, Oct. 30, '37.) 30857.

MANUFACTURE OF A CHEMICAL ABSORBENT for carbon dioxide.—Auerges, A.-G. (Germany, Oct. 25, '37.) 30752.

MANUFACTURE OF REACTION PRODUCTS of nitrosyl-chloride upon aromatic substances.—O. H. Bucher. 30960.

PREPARATION OF PYRIDINIUM COMPOUNDS.—Chemical Works, formerly Sandoz. (Germany, Oct. 21, '37.) 30383.

ANTIDOTE, ETC., FOR USE AGAINST CARBON MONOXIDE GAS.—G. Cruikshank, and W. Parry. 30303.

MANUFACTURE OF ORGANIC COMPOUNDS.—H. Dreyfus. 30964.

MANUFACTURE OF HETEROCYCLIC COMPOUNDS.—S. Ellingworth, F. L. Rose, and Imperial Chemical Industries, Ltd. 30412.

REDUCTION OF OXIDES OF METALS.—J. P. Fraser. 30485.

MANUFACTURE OF A 1-AMINO-2-HYDROXYNAPHTHALENESULPHONIC-3-CARBOXYLIC ACID.—J. R. Geigy, A.-G. (Switzerland, Oct. 22, '37.) 30505.

MANUFACTURE OF ACID AZO DYESTUFFS.—J. R. Geigy, A.-G. (Switzerland, Oct. 27, '37.) 30958.

PRODUCTION OF ORGANIC NITROGEN COMPOUNDS.—Baron P. de Gerlache de Gomery. 30375.

MANUFACTURE OF DERIVATIVES OF SULPHANILAMIDE OF THERAPEUTIC VALUE.—A. G. Green, and M. Coplans. 30771.

FUEL GASES.—A. J. Hailwood, and Imperial Chemical Industries, Ltd. 30753.

Complete Specifications Open to Public Inspection

PRODUCTION AND USE OF CATION EXCHANGER MATERIAL.—Auxiliare des Chemins de Fer et de L'Industrie, and G. V. Austerweil. April 23, 1937. 16989/37.

APPLICATION OF BASE EXCHANGERS as additional products to soils and fertilisers.—Auxiliaire des Chemins de Fer et de L'Industrie, and G. V. Austerweil. April 23, 1937. 16991/37.

PURIFICATION OF WATER and of waste waters for consumption. Eau et Assainissement, Anciens Etablissements C. Gibault. April 19, 1937. 23041/37.

PLASTIC COMPOSITIONS.—Bakelite, Ltd. April 23, 1937. 28991/37.

TREATMENT OF MATERIALS containing sulphuric acid.—Permutit Co., Ltd. April 20, 1937. 6171/38.

STROPHANTHUS GLUCOSIDE and processes for its manufacture.—Chemical Works, formerly Sandoz. April 21, 1937. 7499/37.

MANUFACTURE OF K-STROPHANTHINE-β.—Chemical Works, formerly Sandoz. April 21, 1937. 9456/38.

PROCESS FOR THE MANUFACTURE OF DISUBSTITUTED CARBONIC ACID ESTERS OF PHENOLS.—Hoffman-La Roche and Co., A.-G. April 24, 1937. 9735/38.

PRODUCING POLYMERISATION PRODUCTS of olefines.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 19, 1937. 11097/38.

MANUFACTURE OF COPPER COMPLEX COMPOUNDS of disazo dyestuffs of the stilbene series.—I. G. Farbenindustrie. April 19, 1937. 11570/38.

PRODUCTION OF SUBSTANTIVE POLYAZO DYESTUFFS.—J. R. Geigy, A.-G. April 21, 1937. 11756/38.

MANUFACTURE OF QUATERNARY AMMONIUM COMPOUNDS.—Soc. of Chemical Industry in Basle. April 20, 1937. 11843/38.

MANUFACTURE AND PRODUCTION OF ZINC HYPOSULPHITE.—I. G. Farbenindustrie. April 20, 1937. 11898/38.

MANUFACTURE OF DERIVATIVES OF COERULEIN.—Durand and Huguenin, A.-G. April 21, 1937. 11981/38.

MANUFACTURE OF ACETALS.—E. I. du Pont de Nemours and Co. April 21, 1937. 12038/38.

MANUFACTURE AND APPLICATION OF LIGNIN PRODUCTS.—Chemische Fabrik Von Heyden, A.-G. April 24, 1937. 12330/38.

MANUFACTURE AND PRODUCTION OF LUBRICATING-OILS.—I. G. Farbenindustrie. April 24, 1937. 1235-6/38.

Specifications Accepted with Date of Application

MANUFACTURE OF ADHESIVE POLYMERIC SUBSTANCES and the production of laminated fabrics by the use thereof.—W. Charlton, J. G. Evans, L. G. Lawrie, and Imperial Chemical Industries, Ltd. March 9, 1937. 493,615.

ELECTRO-DEPOSITION OF TIN.—H. R. Preston, A. W. Hothersall, and W. N. Bradshaw. April 7, 1937. 493,701.

MANUFACTURE OF MONOAZO-DYESTUFFS soluble in water.—W. W. Groves (I. G. Farbenindustrie.) April 9, 1937. 493,841.

REMOVAL OF PAINTS, lacquers and varnishes.—Deutsche Hydrierwerke, A.-G. May 27, 1936. 493,766.

MANUFACTURE OF HARD WAX COMPOSITIONS.—Deutsche Hydrierwerke, A.-G. May 27, 1936. 493,766.

MANUFACTURE AND PRODUCTION OF AZO DYESTUFFS.—I. G. Farbenindustrie, and G. W. Johnson. April 12, 1937. 493,911.

DYEING LEATHER.—I. G. Farbenindustrie. April 11, 1936. (Sample furnished.) 493,770.

MANUFACTURE OF OILY CONDENSATION PRODUCTS.—A. P. Lowes, and Imperial Chemical Industries, Ltd. April 12, 1937. 493,715.

RECOVERY OF AMMONIA from used cuprammonium artificial silk precipitation liquors.—I. G. Farbenindustrie. April 11, 1936. 493,716.

POLARISING LAYERS.—I. G. Farbenindustrie. June 12, 1936. 493,775.

REMOVAL OF IMPURITIES FROM GASES by washing.—M. Vogel-Jorgensen. April 13, 1937. 493,776.

VAT-DYESTUFFS of the anthraquinone series.—W. W. Groves (I. G. Farbenindustrie.) April 14, 1937. 493,845.

DYEING OF FURS, pelts, and hair.—J. Burchill, M. Mendoza, G. S. J. White, and Imperial Chemical Industries, Ltd. April 14, 1937. 493,781.

PREPARATION OF ALPHA, beta, unsaturated ketones.—Carbide and Carbon Chemicals Corporation. May 8, 1936. 493,851.

MANUFACTURE OF SULPHUR DYESTUFFS.—I. G. Farbenindustrie. May 23, 1936. 493,856.

ROASTING-REACTION PROCESS FOR THE TREATMENT OF LEAD ORES. Metallges, A.-G. May 18, 1936. (Addition to 482,224.) 493,858.

MANUFACTURE AND PRODUCTION OF LUBRICANTS.—G. W. Johnson (I. G. Farbenindustrie.) April 15, 1937. 493,557.

PRODUCTION OF PIG IRON.—M. Paschke, and E. Peetz. April 15, 1936. (Addition to 454,562.) 493,558.

MANUFACTURE OF ORGANIC NITROGEN COMPOUNDS.—Henkel and Cie. Ges. June 16, 1936. 493,865.

MANUFACTURE OF WHITE PIGMENTS.—I. G. Farbenindustrie. April 17, 1936. 493,871.

STABILISATION OF CHLORINATED HYDROCARBONS.—J. W. C. Crawford, A. I. S. Duncan, and Imperial Chemical Industries, Ltd. April 16, 1937. 493,875.

MANUFACTURE OF ELASTIC ARTICLES from polyvinyl alcohols.—H. Vohrer. Aug. 13, 1936. 493,561.

DRIERS FOR PAINTS, varnishes, and the like.—Nrodex Products, Co., Inc. April 30, 1936. 493,878.

MANUFACTURE OF COMPLEX METAL COMPOUNDS of mordant azo-dyestuffs.—Durand and Huguenin, A.-G. April 20, 1936. (Samples furnished.) 493,883.

FLUORESCENT MATERIALS and method of manufacturing the same.—British Thomson-Houston Co., Ltd. April 22, 1936. 493,722.

MANUFACTURE OF HIGHER ALCOHOLS.—Standard Alcohol Co. June 6, 1936. 493,884.

OBTAINING VALUABLE POLYMERS from hydrocarbon gases.—Standard Oil Development Co., and I. G. Farbenindustrie. June 27, 1936. 493,726.

METHOD FOR MANUFACTURING CALCIUM ARSENATE.—Bolidens Gruvaktiebolag. Sept. 9, 1937. 493,584.

PREPARATION OF RESINOUS COATING COMPOSITIONS.—D. G. Anderson, and R. L. Yeates. Dec. 28, 1937. 493,810.

PRODUCTION OF CONCENTRATED SULPHUR DIOXIDE.—Metallges, A.-G. May 22, 1937. 493,818.

POLYHYDRIC ALCOHOL-POLYCARBOXYLIC ACID CONDENSATION PRODUCTS.—I. G. Farbenindustrie. March 20, 1937. 493,596.

PROTECTION OF MAGNESIUM-RICH ALLOYS against corrosion by electrolytic methods.—H. Sutton, L. F. Le Brocq, and E. G. Savage. Jan. 16, 1937. 493,935.

PRODUCTION OF CARBON BLACK and apparatus therefor.—H. W. K. Jennings (Deutsche Gold-und-Silber-Scheideanstalt vorm. Roessler). March 19, 1937. 494,090.

PROCESS FOR THE MANUFACTURE OF TITANIUM PIGMENTS.—I. G. Farbenindustrie. April 17, 1936. 494,102.

PROCESS FOR THE CATALYTIC DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS.—H. E. Potts (International Hydrogenation Patents Co.). April 20, 1937. 493,947.

METHOD OF HIGH-VACUUM DISTILLATION.—Kodak, Ltd. (Eastman Kodak Co.). April 20, 1937. 493,948.

FLUORESCENT MATERIALS and methods of manufacturing the same. British Thomson-Houston Co., Ltd. April 22, 1936. 494,299.

MANUFACTURE OF VAT DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) April 20, 1937. (Sample furnished.) 494,168.

MANUFACTURING IMPREGNATED PRODUCTS.—J. Lecacheux. April 20, 1937. 494,231.

MEANS FOR THE PRODUCTION OF COARSELY CRYSTALLINE AMMONIUM SULPHATE or the like.—H. Koppers Industrieele Maatschappij N.V. April 20, 1936. 494,171.

MANUFACTURE OF COMPOSITIONS COMPRISING SOFTENING AGENTS. A. Carpmael (I. G. Farbenindustrie.) April 21, 1937. 494,234.

MANUFACTURE OF ADIPONITRILE.—E. I. du Pont de Nemours and Co. April 21, 1936. 494,236.

COLOURING ACETATE ARTIFICIAL SILK.—R. W. Hardacre, N. E. Holden, C. Shaw, and Imperial Chemical Industries, Ltd. April 21, 1937. 494,237.

PROCESS FOR THE MANUFACTURE OF 1.3-DIAZOANTHRAQUINONES.—A. Carpmael (I. G. Farbenindustrie.) April 22, 1937. 494,243.

MANUFACTURE OF AMINO-SUBSTITUTED ARSENOBENZENE FORMALDEHYDEBISULPHITE COMPOUNDS.—I. G. Farbeniadustrie. May 22, 1936. 494,249.

PREPARATION OF PIGMENTS containing zinc oxide.—L. A. Jordan, and C. W. Price. May 25, 1937. 494,030.

MANUFACTURE AND PRODUCTION OF AMINOQUINALDINES.—G. W. Johnson (I. G. Farbenindustrie.) May 31, 1937. 494,183.

MANUFACTURE OF HYDROXY AMINO COMPOUNDS.—H. H. Bassford, jun., and Belvedere Chemical Co., Ltd. June 10, 1937. 493,960.

MANUFACTURE OF NITROGEN CHLORIDE.—Naamlooze Vennootschap Industrieele Maatschappij Voorheen Noury and Van Der Lande. June 30, 1936. 494,188.

MANUFACTURE AND PRODUCTION OF LUBRICATING GREASES.—G. W. Johnson (I. G. Farbenindustrie.) June 24, 1937. 494,189.

THERMAL TREATMENT OF ALUMINIUM and aluminium base alloys. Aluminium Laboratories, Ltd. Oct. 1, 1936. 494,274.

MANUFACTURE AND PRODUCTION OF CONDENSATION PRODUCTS having tanning action.—G. W. Johnson (I. G. Farbenindustrie.) July 22, 1937. 494,042.

CONCENTRATING PHOSPHATE-BEARING MINERALS.—A. H. Stevens (Phosphate Recovery Corporation). Aug. 16, 1937. 493,970.

ANODIC OXIDATION OF ARTICLES made of aluminium or its alloys. E. Potter (Montecatini Soc. Generale per l'Industrie Mineraria ed Agricola). Oct. 19, 1937. 494,054.

OBTENTION OF A THOROUGH SAPONIFICATION during the production of a soap from highly split distilled fatty acids with concentrated soda lye in the open boiler.—L. N. Cox (Heilsberg and Co., Ges.). Oct. 25, 1937. (Convention date not granted.) 494,056.

TREATMENT OF ORGANIC ACID ANHYDRIDES.—British Celanese, Ltd. Dec. 24, 1936. 494,214.

SOLVENT DEWAXING OF LUBRICATING-OILS.—Standard Oil Development Co. Feb. 3, 1937. 494,215.

RECOVERY OF NAPHTHALENE.—E. Coppee and Cie. Jan. 3, 1938. 493,992.

PREPARATION OF DERIVATIVES OF OESTRADIOL.—Chinoin Gyogyszer es Vegyeszeti Termekek Gyara R.T. (Dr. Kereszty and Dr. Wolf). Feb. 17, 1937. 493,996.

PRODUCTION OF FADELESS TANNING AGENTS.—J. R. Geigy, A.-G. Feb. 10, 1937. 493,997.

LEAD ALLOYS.—Chloride Electrical Storage Co., Ltd. Feb. 13, 1937. 494,069.

RECOVERY OF SOLVENT MIXTURES used for refining or dewaxing hydrocarbon oils.—Edeleanu Ges. Feb. 25, 1937. 493,999.

Chemical and Allied Stocks and Shares

THE industrial and other sections of the Stock Exchange had a less active week, and in the majority of cases the recent improvement in values has not been fully held. The less active market conditions were attributed to a disposition to await news as to the accelerated rearmament programme and allied developments now that Parliament has reassembled.

Securities of chemical and allied companies moved in accordance with the general market trend, but in some cases larger demand was reported. Fison, Packard and Prentice have risen to 39s. on consideration of the statements at the recent meeting, while B. Laporte were rather more active and changed hands around the higher level of 87s. 6d. Borax Consolidated deferred fluctuated moderately, but at 25s. 9d., are unchanged on balance, the market still being hopeful that the directors may shortly make a statement as to the company's progress to date. Lever and Unilever ordinary units were also subject to fluctuations, but are 36s. 3d. at the time of writing, the same as a week ago. Hopes that the forthcoming interim dividend of the latter company will be kept at 4 per cent. continued to be held in the market. Triplex Glass ordinary units again benefited from the more hopeful views as to the outlook for the motor car trade, and at 32s. 9d. the price has improved 1s. on balance. Lancegaye Glass shares were also reported to be fairly active. United Glass Bottle were quoted at 47s. 6d. Key Glassworks ordinary shares transferred around 55s., and have attracted rather more attention on the possibility that the forthcoming results may show a rather higher dividend. Murex were better at 76s. 10½d., and Turner and Newall are also at this price at the time of writing, which, however, compares with 77s. 6d. a week ago. British Oxygen were slightly lower at 71s. 10½d. as were British Aluminium at 53s. Swedish Match shares continued to benefit from the belief that the company's earning power is showing improvement, and the price has moved up 6d. to 29s. 3d.

Boots Pure Drug at 40s. 3d. were little changed, as were Sangers at 21s. 9d., while British Drug Houses were again around 21s. On the other hand, Timothy Whites and Taylors were lower at 23s. 6d. Beechams Pills deferred were again 8s., following the further developments announced by the company this week. Enfield Rolling Mills were rather more active, awaiting the results. Imperial Smelting were active around 12s. 9d. in advance of the meeting which was awaited with a good deal of interest for views as to the outlook for the zinc smelting and allied trades.

Dorman Long at 28s. 6d. have lost part of their recent good advance, but Colvilles were little changed at 24s., aided by the maintenance of the interim dividend at 3 per cent. United Steel at 25s. 10½d. are within 3d. of the price ruling a week ago and Consett Iron, Staveley and Stewarts and Lloyds were also little changed on balance. Wall Paper deferred have declined rather sharply to 34s. on the preliminary figures which show lower profits, although the 12½ per cent. dividend is again earned with a satisfactory margin. British Plaster Board attracted rather more attention on the hope that the forthcoming interim payment will be kept at 20 per cent. Pinchin Johnson and most paint shares were fairly steady, including Lewis Berger, whose results are imminent.

Leading oil shares were again lower on balance, but at the time of writing a firmer tendency has developed, particularly in Trinidad Leaseholds. The meeting of the latter company is to be held on Thursday of next week.

Weekly Prices of British Chemical Products

BUSINESS in the chemical markets during the past week has followed a very even trend and activity has mainly been confined to spot transactions. Ex-contract deliveries are reported to be satisfactory and the volume of inquiry for new long term business is regarded as promising. There have been no official price changes for general chemicals, rubber chemicals and wood distillation products, and a steady tone prevails throughout. Conditions in the coal tar section remain decidedly slow with no immediate prospects of any improvement. Owing to an accumulation of stocks creosote is again a little weaker.

Price Changes

Rises: Copper Sulphate (Manchester); Pyridine, 90/140%; 90/160%; 90/180%.

Falls: Carbolic Acid, crude, 60's; Creosote, home trade and export (Manchester); Cresylic Acid, pale, 99/100% (Manchester); Naphthalene, crude, whizzed or hot pressed; refined (Manchester); Pitch, medium, soft.

MANCHESTER.—Prices have been generally steady on the Manchester chemical market during the past week, and in one or two instances it is already reported that current values will be maintained in respect of contract commitments for delivery over next year. For the most part new business is on very moderate lines, but here and there some improvement continues to be experienced in the rate at which deliveries of heavy chemicals are being taken up in the district against old contracts. With regard to the by-products there is little change on balance to record. Forward buying this week has been on a restricted scale and there has been no improvement in the general price position. Creosote oil is one of several sections where the tendency seems to be towards lower levels.

GLASGOW.—Business in general chemicals has continued rather quiet during the week for home trade and also for export. Prices, however, continue very firm at about previous figures with no special changes to report.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey, £18 10s. per ton, d/d U.K. Fine white, 98%, £17 per ton, d/d U.K.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8¼d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £12 per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 2¾d. per lb.; liquor, £13 per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—10d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—11½d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£18 5s. per ton, less 2% in casks. MANCHESTER: £19 2s. 6d. per ton f.o.b. SCOTLAND: £19 per ton, less 5%, Liverpool in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £3 17s. 6d. to £4 17s. 6d. per cwt. according to quantity; in drums, £3 10s. 0d. to £4 2s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 9d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £30; brown, £1 per ton less. MANCHESTER: White, £31; brown, £30.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£31 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £31 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £31 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—Calcined, in bags, ex works, about £8 per ton. SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—Solid (ex wharf) £5 10s. per ton. SCOTLAND: £7 5s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. pe. lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £40 per ton according to quantity, ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 per ton.

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 6s. 3d. per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¼d. to 10¼d. per lb. SCOTLAND: B.P. Crystals, 10½d. MANCHESTER: B.P. 9½d. to 11½d.

POTASSIUM PRUSSIATE.—6¼d. per lb. SCOTLAND: 6¾d. net, in casks, ex store. MANCHESTER: Yellow, 6¼d. to 6½d.

PRUSSIATE OF POTASH CRYSTALS.—In casks, 6¾d. per lb. net, ex store

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 11s. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

Soda, Caustic.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. Scotland: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£19-£20 per ton carriage paid North. Glasgow: £18 10s. per ton net ex store.

Sodium Bicarbonate.—Refined spot, £10 15s. per ton d/d station in bags. Glasgow: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. Manchester: £10 15s.

Sodium Bisulphite Powder.—60/62%, £14 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£27 10s. to £32 per ton. Glasgow: £1 11s. per cwt., minimum 3 cwt. lots.

Sodium Dichromate.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts.

Sodium Chromate.—4½d. per lb. d/d U.K.

4d. per lb. Glasgow: 4¼d. net, carriage paid.

Sodium Hyposulphite.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. Manchester: Commercial, £11; photographic, £15 10s.

Sodium Metasilicate.—£14 5s. per ton, d/d U.K. in cwt. bags.

Sodium Nitrate.—Refined, £8 per ton for 6-ton lots d/d. Glasgow: £1 12s. 0d. per cwt. in 1-cwt kegs, net, ex store.

Sodium Nitrite.—£18 5s. per ton for ton lots.

Sodium Perborate.—10%, 9½d. per lb. d/d in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £16 10s. per ton delivered per ton lots.

Sodium Prussiate.—½d. per lb. for ton lots. Glasgow: 5d. to 5¾d. ex store. Manchester: 4¼d. to 5¼d.

Sodium Silicate.—£8 2s. 6d. per ton.

Sodium Sulphate (Glauber Salts).—£3 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. Scotland: Ground quality, £3 5s. per ton d/d. Manchester: £3 12s. 6d.

Sodium Sulphide.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. Manchester: Concentrated solid, 60/62%, £11; commercial, £8 10s.

Sodium Sulphite.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

Sulphur Precip.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

Sulphuric Acid.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

Tartaric Acid.—1s. 1¼d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. Manchester: 1s. 1¼d. per lb. Glasgow: 1s. 1¼d. per lb., 5%, ex store.

Zinc Sulphate.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

Antimony Sulphide.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

Arsenic Sulphide.—Yellow, 1s. 5d. to 1s. 7d. per lb.

Barytes.—£6 to £6 10s. per ton, according to quality.

Cadmium Sulphide.—3s. 6d. to 3s. 9d. per lb.

Carbon Black.—3¾d. to 4 1/16d. per lb., ex store.

Carbon Disulphide.—£31 to £33 per ton, according to quantity, drums extra.

Carbon Tetrachloride.—£41 to £46 per ton, according to quantity, drums extra.

Chromium Oxide.—Green, 10½d. to 11½d. per lb.

Diphenylguanidine.—2s. 2d. per lb.

India-rubber Substitutes.—White, 4¾d. to 5⅛d. per lb.; dark 3¾d. to 4⅛d. per lb.

Lamp Black.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

Lead Hyposulphite.—9d. per lb.

Lithopone.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.

Sulphur.—£9 to £9 5s. per ton. Sulphur precip. B.P., £55 to £60 per ton. Sulphur precip. comm., £50 to £55 per ton.

Sulphur Chloride.—5d. to 7d. per lb., according to quantity.

Vermilion.—Pale, or deep, 4s. 9d. per lb., 1-cwt. lots.

Zinc Sulphide.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

Ammonium Sulphate.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1939; November, £7 8s.; December, £7 9s. 6d.; January, 1939; £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

Calcium Cyanamide.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1939; November, £7 12s. 6d.; December, £7 13s. 9d.; January, 1939, £7 15s.; February, £7 16s. 3d.; March, £7 17s. 6d.; April/June, £7 18s. 9d.

Nitro Chalk.—£7 10s. 6d per ton up to June 30, 1939.

Sodium Nitrate.—£8 per ton for delivery up to June 30, 1939.

Concentrated Complete Fertilisers.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

Ammonium Phosphate Fertilisers.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

Benzol.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3¼d. to 1s. 4d.; 90%, 1s. 4½d. to 1s. 5d., pure 1s. 8½d. to 1s. 9d. Glasgow: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. Manchester: Pure, 1s. 8d. per gal.; crude, 1s. per gal.

Carbolic Acid.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 1s. 7½d. to 1s. 10½d.; dehydrated, 2s. 6d. per gal., according to specification; Pale, 99/100%, per lb. f.o.b. in drums; crude, 2s. 1d. per gal.

Creosote.—Home trade, 4d. per gal., f.o.r. makers' works; exports 6d. to 6½d. per gal., according to grade. Manchester: 3¾d. to 4½d. Glasgow: B.S.I. Specification, 6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5¾d. to 6½d.

Cresylic Acid.—97/99%, 1s. 9d. to 2s.; 99/100%, 2s. 6d. to 3s. 6d. per gal., according to specification; Pale, 99/100%, 2s. 1d. to 2s. 3d.; Dark, 95%, 1s. 7d. to 1s. 8d. per gal. Glasgow: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. Manchester: Pale, 99/100%, 1s. 10d.

Naphtha.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. Glasgow: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

Naphthalene.—Crude, whizzed or hot pressed, £4 10s. to £5 10s. per ton; purified crystals, £11 per ton in 2-cwt. bags. London: Fire lighter quality, £3 to £4 10s. per ton. Glasgow: Fire lighter, crude, £6 to £7 per ton (bags free). Manchester: Refined, £12 to £13 per ton f.o.b.

Pitch.—Medium, soft, 31s. per ton, f.o.b. Manchester: 31s. 6d. f.o.b., East Coast. Glasgow: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

Pyridine.—90/140%, 12s. to 13s. per gal.; 90/160%, 9s. 8d. to 11s. per gal.; 90/180%, 3s. to 4s. per gal. f.o.b. Glasgow: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. Manchester: 10s. to 12s. per gallon.

Toluol.—90%, 1s. 10d. per gal.; pure 2s. 2d. Glasgow: 90% 120, 1s. 10d. to 2s. 1d. per gal. Manchester: Pure 2s. 4d. per gallon, naked.

Xylol.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. Glasgow: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £6 15s. to £9 5s. per ton; grey, £8 5s. to £8 10s. Manchester: Brown, £8s. 10d.; grey, £9 15s.

Methyl Acetone.—40.50%, £32 to £35 per ton.

Wood Creosote.—Unrefined, 6d. to 8d. per gal., according to boiling range.

Wood Naphtha, Miscible.—2s. 8d. to 3s. per gal.; solvent, 3s. 3d. to 3s. 6d. per gal.

Wood Tar.—£3 to £8 per ton, according to quality.

Intermediates and Dyes

Aniline Oil.—Spot, 8d. per lb., drums extra, d/d buyer's works.

Aniline Salts.—Spot, 8d. per lb. d/d buyer's works, casks free.

Benzidine, HCl.—2s. 7½d. per lb., 100% as base, in casks.

Benzoic Acid, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.

***m*-Cresol 98/100%.**—1s. 8d. to 1s. 9d. per lb. in ton lots.

***o*-Cresol 30/31° C.**—6½d. to 7½d. per lb. in 1-ton lots.

***p*-Cresol, 34-5° C.**—1s. 7d. to 1s. 8d. per lb. in ton lots.

Dichloraniline.—2s. 1½d. to 2s. 5d. per lb.

Dimethylaniline.—Spot, 1s. 7½d. per lb., package extra.

Dinitrobenzene.—7½d. per lb.

Dinitrochlorbenzene, Solid.—£79 5s. per ton.

Dinitrotoluene.—48/50° C., 8½d. per lb.; 66/68° C., 11d.

Diphenylamine.—Spot, 2s. 2d. per lb., d/d buyer's works.

Gamma Acid, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H Acid.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

Naphthionic Acid.—1s. 10d. per lb.

β-Naphthol.—£97 per ton; flake, £94 8s. per ton.

***α*-Naphthylamine.**—Lumps, 1s. 1d. per lb.

β-Naphthylamine.—Spot, 3s. per lb.; d/d buyer's works.

Neville and Winther's Acid.—Spot, 3s. 3½d. per lb. 100%.

***o*-Nitraniline.**—4s. 3½d per lb.

***m*-Nitraniline.**—Spot, 2s. 10d. per lb. d/d buyer's works.

***p*-Nitraniline.**—Spot, 1s. 10d. to 2s. 1d. per lb. d/d buyer's works.

Nitrobenzene.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

Nitronaphthalene.—9½d. per lb.; P.G., 1s. 0½d. per lb.

Sodium Naphthionate.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

Sulphanilic Acid.—Spot, 8¾d. per lb. 100%, d/d buyer's works.

***o*-Toluidine.**—10½d. per lb., in 8/10 cwt. drums, drums extra.

***p*-Toluidine.**—1s. 10½d. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 3d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRADFORD FERTILISER CO., LTD. (formerly Bradford By-Product and Fertiliser Co., Ltd.), Cockermouth. (M., 5/11/38.) Oct. 19, £3,500 debenture, to Special Areas Reconstruction Association, Ltd.; general charge. *Nil. Dec. 31, 1937.

ELEPHANT CHEMICAL CO., LTD., London, S.E. (M., 5/11/38.) Oct. 21, £1,000 debenture, to L. Dreyfus, London; general charge (subject to, etc.). *£7,750. Sept. 30, 1938.

PALORIT PAINTS, LTD., London, N.W. (M., 5/11/38.) Oct. 25, £2,000 debenture, to A. F. H. S. Simpson, London; general charge. *Nil. Dec. 31, 1937.

UNOPOL PRODUCTS, LTD., Chertsey, manufacturers of polishes. (M., 5/11/38.) Oct. 19, £850 mortgage, to E. M. and H. Gover, London; charged on land, stables, garage and other buildings at Gogmore Lane, Chertsey.

Satisfactions

CHEMICAL ENGINEERING AND WILTON'S PATENT FURNACE CO., LTD., London, S.W. (M.S., 5/11/38.) Satisfactions Oct. 21, £900, etc., registered June 2, 1923, and £750, balance of debentures registered July 12, 1923.

Company News

Midland Tar Distillers report for the year ended June 30, net profit of £31,625. Meeting at Birmingham on November 10.

British Match Corporation announces an interim dividend of 2¾ per cent., less tax. The half-yearly preference dividend at the rate of 5 per cent. p.a., less tax, is also declared.

Beechams Pills, Ltd.—A proposal to increase the capital to £4,000,000 by the creation of 4,000,000 deferred shares of 2s. 6d. each will be considered at a meeting on November 10.

Chema Manufacturing Co., Ltd., chemical manufacturers, have increased their nominal capital by the addition of £3,500 in £1 ordinary shares, beyond the registered capital of £500.

Eastern Chemical Co., report a profit for the year ended March 31, of £317. Debit balance forward, £51,826 (£52,143). Meeting at 13 Fenchurch Avenue, E.C.3, at 3 p.m., on November 7.

Chemical Engineering and Wilton's Patent Furnace Co., Ltd., have increased their nominal capital by the addition of £2,950 in £1 ordinary shares beyond the registered capital of £22,000.

Morris Allison and Co., Ltd., manufacturers of chemicals, colours and inks, etc., have increased their nominal capital by the addition of £1,000 beyond the registered capital of £1,000. The additional capital is divided into 1,000 7½ per cent. cumulative preference shares of £1.

The Celanese Corporation of America consolidated earnings statement for the twelve months ended September 30 shows a total income of $3,717,826. After allowing for depreciation, interest on debentures and other long-term debt, amortisation of debenture expenses, and Federal tax provision, the net income is $1,857,336. The net profit for the third quarter of 1938 was $1,325,099 ($1,025,208).

Books Received

An Introduction to Industrial Mycology. By G. Smith. London: Edward Arnold & Co., Ltd. Pp. 302. 16s.

Library Guide for the Chemist. By B. A. Soule. London: McGraw-Hill Publishing Co., Ltd. Pp. 302. 15s.

An Introduction to the Chemistry of Cellulose. By J. T. Marsh and F. C. Wood. London: Chapman & Hall, Ltd. Pp. 431. 21s.

Generalregister der Zeitschrift für das gesamte Schiess und Sprengstoffwesen mit der Sonderabteilung "Gasschutz" (collected index for Vols. 1-30, 1906-1935). Munich: Verlag der Zeitschrift für das gesamte Schiess und Sprengstoffwesen. Pp. 448. RM 60; bound in linen, RM 80.

Forthcoming Events

London.

November 7.—Society of Chemical Industry. Burlington House, Piccadilly, W.1. 8 p.m. Joint Meeting with the Chemical Engineering Group.

November 8.—Pharmaceutical Society. 17 Bloomsbury Square, W.C.1. 8.30 p.m. Dr. O. Leeser, "Homoepathy and its Pharmaceutical Aspects."

November 10.—Oil and Colour Chemists Association. A. de Waele, "Some Properties of Nitrocellulose Sols."

November 14.—Institution of the Rubber Industry. Northumberland Rooms, Northumberland Avenue, W.C.2. 7.30 p.m. S. A. Brazier, "Are Quality Specifications for Rubber Goods Necessarily Unsatisfactory?"

November 14-19.—Public Health Services Congress and Exhibition. Royal Agricultural Hall.

November 16.—Institute of Chemistry. (London and South-Eastern Counties Section). Annual General Meeting and Smoking Concert. Palace Hotel, Bloomsbury Street, W.C.1.

Birmingham.

November 15.—Institute of the Plastics Industry. James Watt Memorial Institute, Great Charles Street. 8 p.m. Major T. Knowles, "Industrial Tendencies and the Export Trade."

Derby.

November 11.—British Association of Chemists. Brailsford Café, Green Lane, Derby. 7.30 p.m. P. R. Hawtin, "Colour Cinematography."

Hull.

November 15.—Hull Chemical and Engineering Society. Municipal Technical College, Park Street. 7.15 p.m. N. D. Pullen, "Modern Developments in the Aluminium Industry."

Ipswich.

November 8.—Institute of Chemistry (East Anglia Section). Central Public Library. H. B. Brown, "War Time Chemical Problems."

Leeds.

November 11.—The Chemical Society. D. H. Bangham, "The Structure of Films Adsorbed at Solid Surfaces."

Liverpool.

November 7.—Chemical Society. The University. 6 p.m. Professor E. L. Hirst, "Recent Progress in the Chemistry of the Starches."

Manchester.

November 11.—British Association of Chemists. "Chemical Aspect of Air-Raid Precautions."

November 14.—Institute of the Plastics Industry. Engineers' Club, Albert Square. 7.30 p.m. Dr. F. Riesenfeld, "Cast Resins."

November 15.—Annual Conjoint Meeting of Manchester Chemical Societies arranged by the Manchester Literary and Philosophical Society. Reynolds Hall, College of Technology, 7 p.m. Hugh B. Cott, "Camouflage in Nature and in War."

Newcastle.

November 8.—Institute of Metals. King's College. 7.30 p.m. L. W. Schuster, "Relationship between Mechanical Properties and Results in Service."

Scotland.

November 11.—Oil and Colour Chemists' Association (Scottish Section). C. Sisley, "Enemies of Timber."

Sheffield.

November 11.—Institute of Metals. The University, St. George's Square. 7.30 p.m. H. Wrighton, "The Expert Use of the Microscope."

Swansea.

November 8.—Institute of Metals. Y.M.C.A., Swansea. 6.30 p.m. H. J. Miller, "Copper Alloys and their Adaptation to Modern Engineering Requirements."

November 10.—Chemical Society and University College of Swansea Chemical Society. University College. 6 p.m. Professor J. W. Cook, "Chemical Carcinogenic Agents."

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—A well-established firm of manufacturers' agents and wholesale merchants at Sydney wishes to obtain the representation, on a basis to be arranged, of United Kingdom manufacturers of products of interest to manufacturing chemists, wholesale chemists, photographers, and the film industry (particularly phenacetin, potassium bromide, sodium bromide, ammonium bromide, potassium iodide, salicylic acid and benzoic acid), cosmetic manufacturers, for the whole of the Commonwealth with the exception of Western Australia. (Ref. No. 300.)

Holland.—A well-established agent at Rotterdam wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of red lead, white lead, zinc oxide, and lithopone in powder form for Holland. (Ref. No. 311.)